Welcome to the WHEA's

Lunch & Learn

October 8, 2020

One-Line Diagrams

Presented by Bill Lauzon

LLSC Lauzon Life Safety Consulting

One-Line Diagrams

an over looked & underutilized tool

They:

1. Aid in training employees about the building
2. Give employees the ability to quickly address utility issues
3. Are helpful for code compliance
4. Are helpful for emergency response

We explore how to
read, create, and use one-line diagrams

Presenter: **Bill Lauzon** (professional engineer)

Wis Liaison

CMS
CENTERS for MEDICARE & MEDICAID SERVICES

<u>2006-2011</u>
DHS-DQA
“Surveyor & Plan Reviewer”

<u>2011-2017</u>
Lauzon Life Safety Consulting

Healthcare Survey Prevention

<u>WHEA</u>
Code & Education Committees

<u>1973-2006</u> (33 yrs)
“Facility Engineer”
Tomah – Fargo- Madison
Kenosha - Racine

Available to Assist Customers:

Heather Lauzon Werner

LLSC Lauzon Life Safety Consulting

President since 2015

3 Years - Director of Environment of Care at combined rehab hospital, CBRF, RCC, and school

Since 2012 – Statewide Consultant

Available to Assist Customers:

Alex Werner

LLSC Lauzon Life Safety Consulting

2018-Present

Coordinator,
Documentation Specialist

Lauzon Life Safety
Consulting, LLC

Business Degree
Anticipated 2021

Bill Lauzon

One-Line Diagrams

(aka: Single-Line Diagrams)
(aka: Riser Diagrams)

1. Electrical 1-Lines
2. Plumbing 1-Lines
3. HVAC 1-Lines
4. Med Gas 1-Lines
5. Sprinkler 1-Lines

Bill Lauzon

One-Line Diagrams

1.

2.

Ask Questions throughout the webinar via CHAT box

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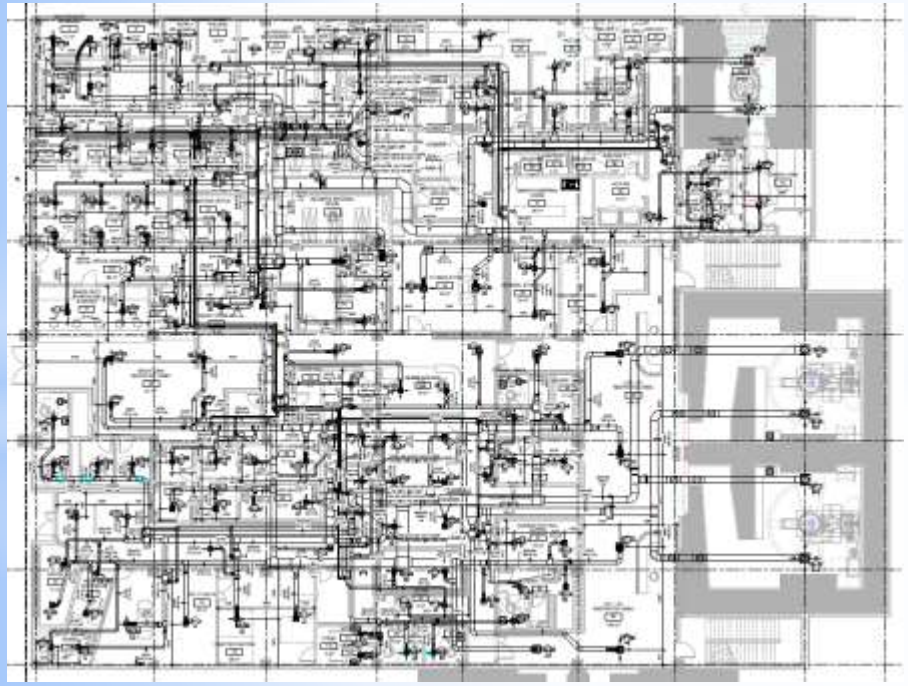
One-Line Diagrams

1.

2.

Before we get started, let's go over some <u>what</u> and <u>why</u> clarifications

What: Types of Diagrams



2D Floor Plans

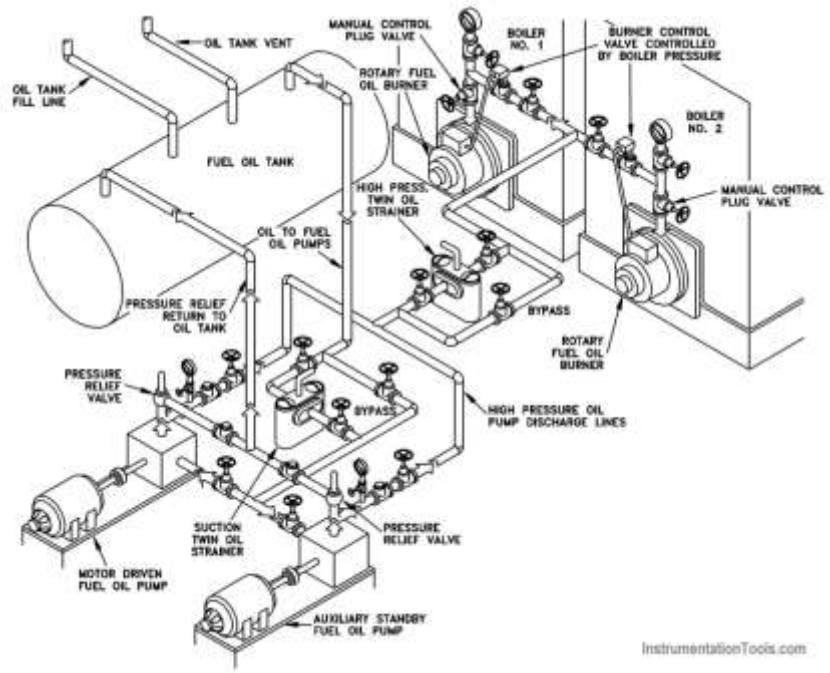
Pros:

- Can show large area
- Shows device & room/wall relationship

Cons:

- Very complicated if showing multiple systems
- Usable for only 1 floor
- Difficult to follow vertical relationships

What: Types of Diagrams



3D Isometric

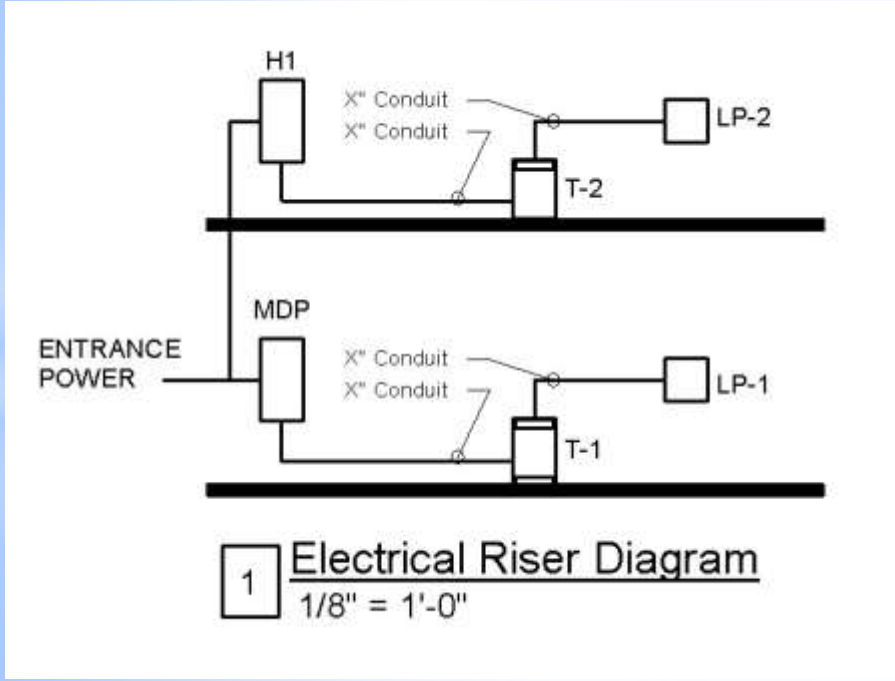
Pros:

- Shows horizontal & vertical relationships

Cons:

- Confusing if showing multiple systems or floors
- Very large if showing multiple floors

What: Types of Diagrams



2D Riser

(aka: 1-Line Diagram)

Pros:

- Can show many vertical floors
- Shows vertical relationships well

Cons:

- Difficult to show horizontal relationships
- Confusing if show multiple systems

Why: 1-Lines ?

Three Primary Reasons

#1

#2

#3

Why: 1-Lines ?

#1 

- Maintenance staff must know how each utility system works
- One-Line Diagrams give a simplied overview of the system
- Clearly shows shut-off locations

Why: 1-Lines ?

#2

- Maintenance staff must know how to quickly shut-down systems
- One-Line Diagrams show the area of service & controls

Why: 1-Lines ?

#3

Joint Commission Requirements

- Utility risk management is required
- One-Line Diagrams are one step to comply with this code requirement

Why 1-Lines ?

EC.02.05.01 – Manage risks associated with utility systems

- EP 1 - Designed & installed per NFPA codes
- EP 2 - Designed per NFPA 99 Risk Categories (Chap 4)
- EP 3 – Written inventory of components
- EP 4 – High risk components on inventory (Risk Category 1)
- EP 5 – Inspection/testing program
- EP 6 – ITM per manufacturer's recommendations

Why 1-Lines ?

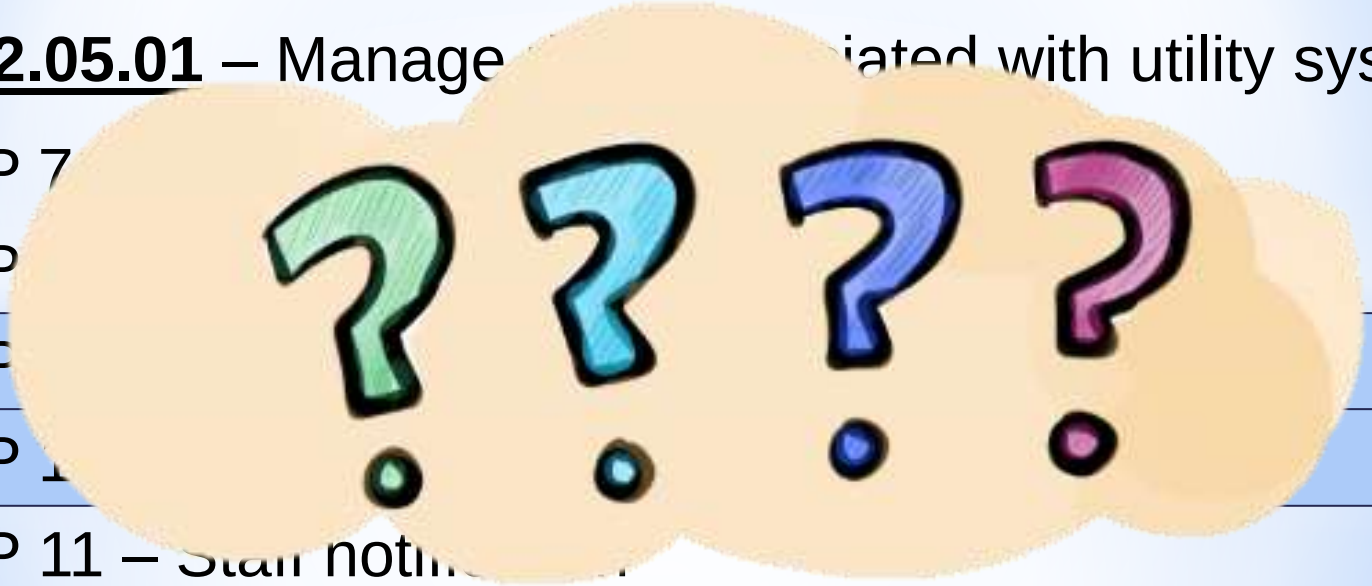
EC.02.05.01 – Manage risks associated with utility systems

- EP 7 – Qualified operating staff
- EP 8 – Alternative maintenance program
- EP 9 – Shutdown control labeling
- EP 10 – Disruption procedures
- EP 11 – Staff notification
- EP 12 – Emergency clinical procedures

Why 1-Lines ?

EC.02.05.01 – Manage [illegible] iated with utility systems

- EP 7 [illegible]
- EP [illegible]
- EP [illegible]
- EP 1[illegible]
- EP 11 – Staff notif[illegible]
- EP 12 – Emergency clinical procedures



Bill Lauzon

One-Line Diagrams

1. Electrical 1-Lines
2. Plumbing 1-Lines
3. HVAC 1-Lines
4. Med Gas 1-Lines
5. Sprinkler 1-Lines

Electrical 1-Line Diagrams

Your road map to the power distribution system

Electrical 1-Line Diagrams

Definition

NFPA 70E Article 100, Definitions

Single-Line Diagram. A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used in the circuit or system.

Electrical 1-Line Diagrams

Electrical 1-line is the most common of all utility 1-lines

Included in almost all professionally drawn electrical plans

Electrical 1-Line Diagrams

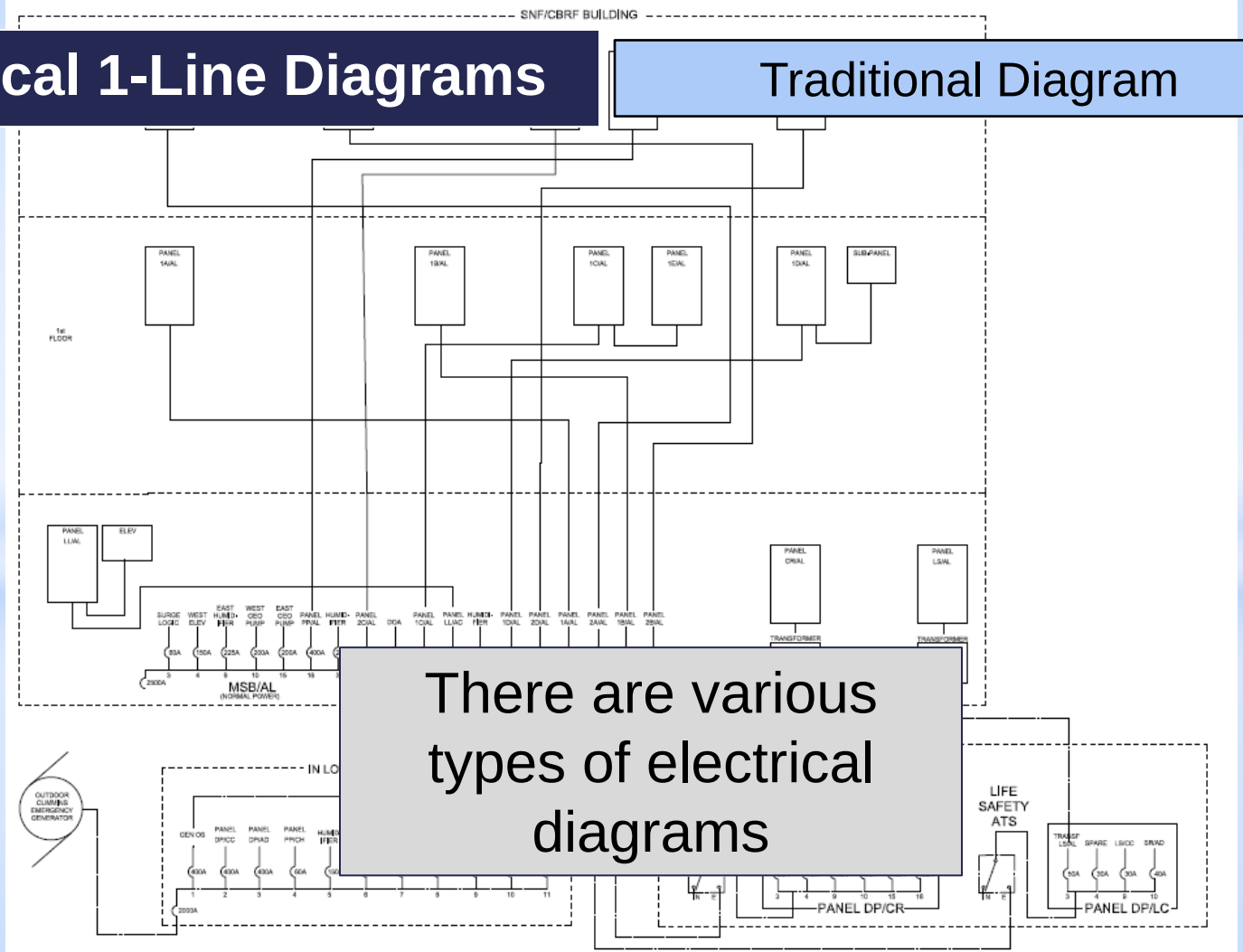
Uses

An up-to-date single-line diagram is vital for a variety of service activities including:

- Short circuit calculations
- Coordination studies
- Load flow studies
- Safety evaluation studies
- All other engineering studies
- Electrical safety procedures
- Efficient maintenance

Electrical 1-Line Diagrams

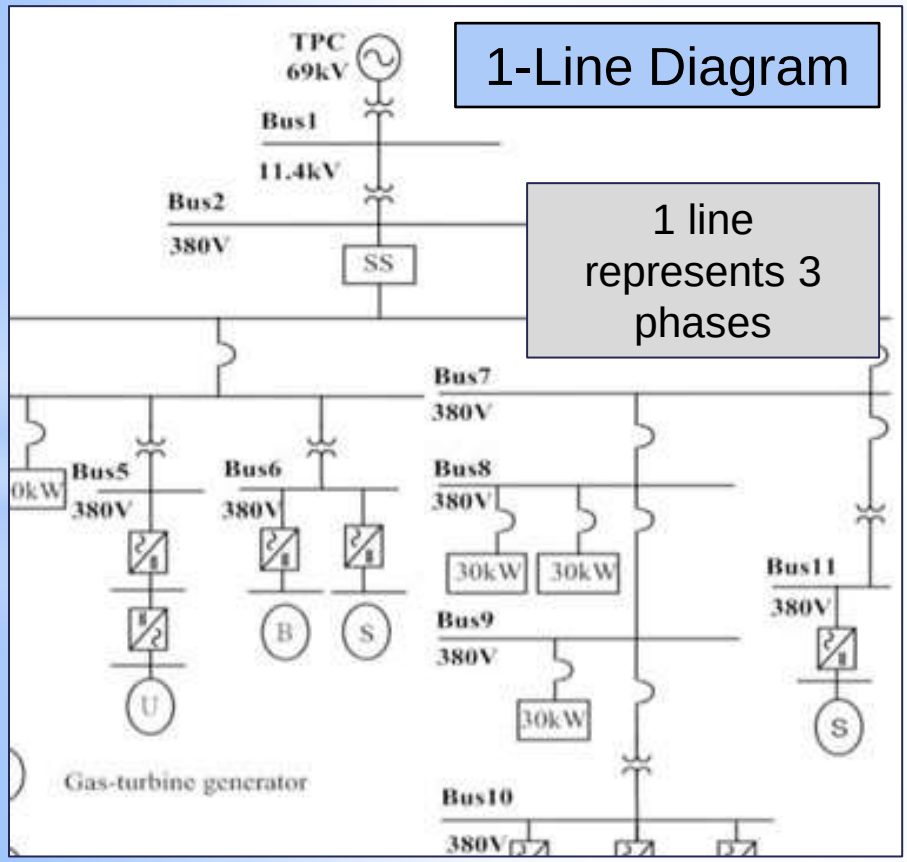
Traditional Diagram

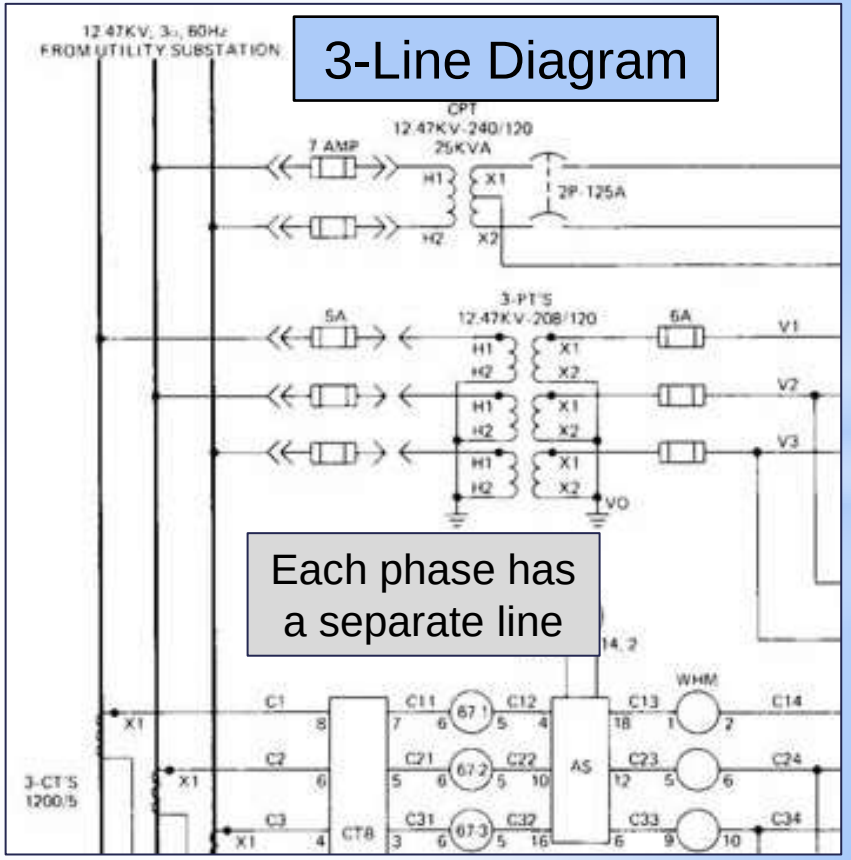


There are various types of electrical diagrams

Electrical 1-Line Diagrams

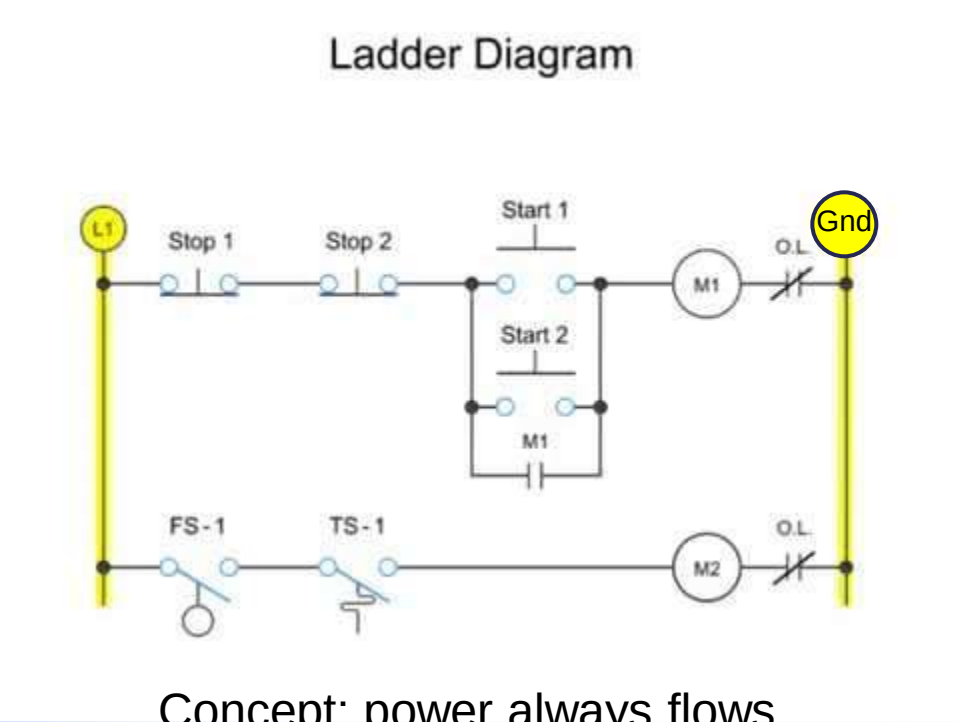
1-Line vs 3-Line





Electrical 1-Line Diagrams

“Ladder” Electrical Diagram



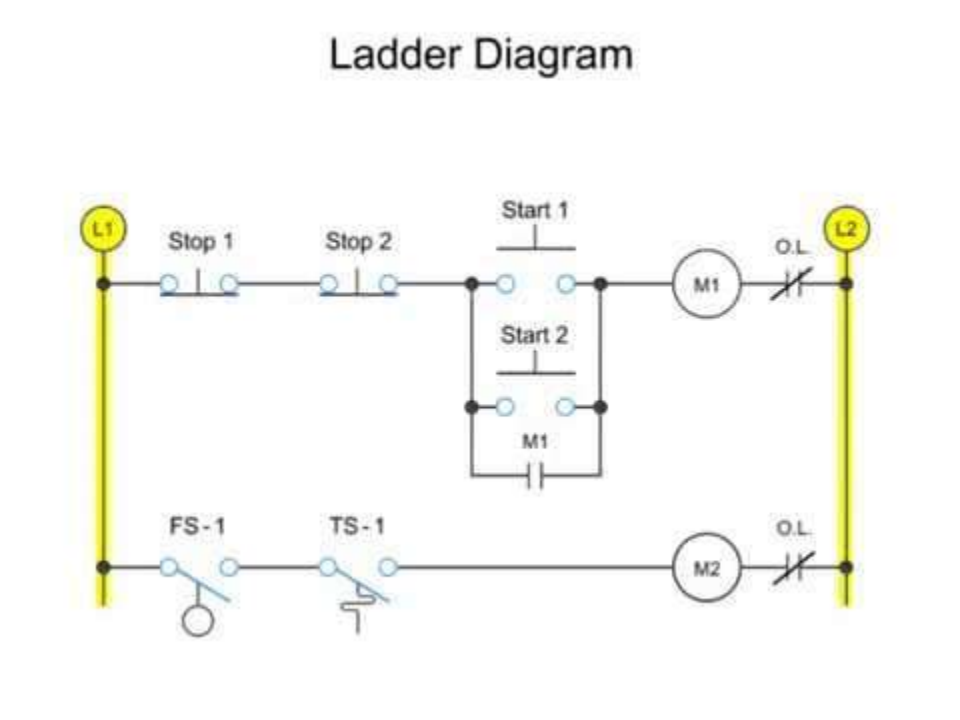
1 pole system

Frequently used on control drawings

Concept: power always flows from source to ground →

Electrical 1-Line Diagrams

“Ladder” Electrical Diagram



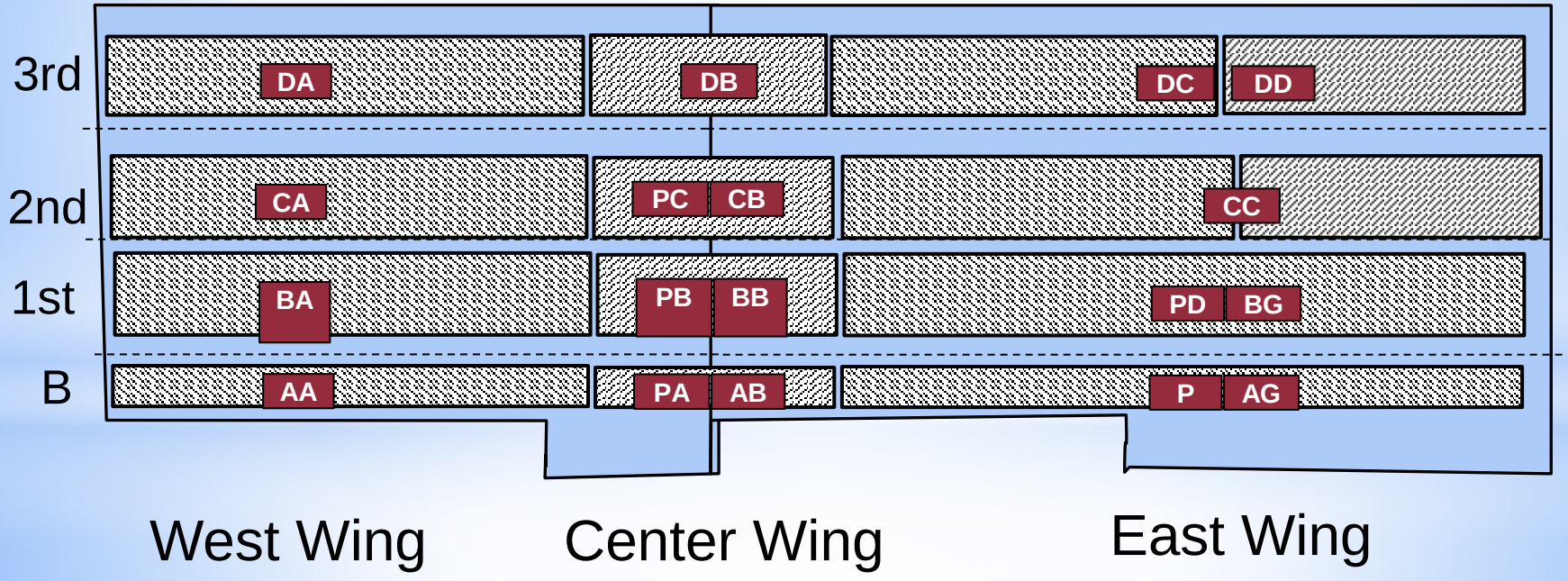
2 pole system

Frequently used on control drawings

Electrical 1-Line Diagrams

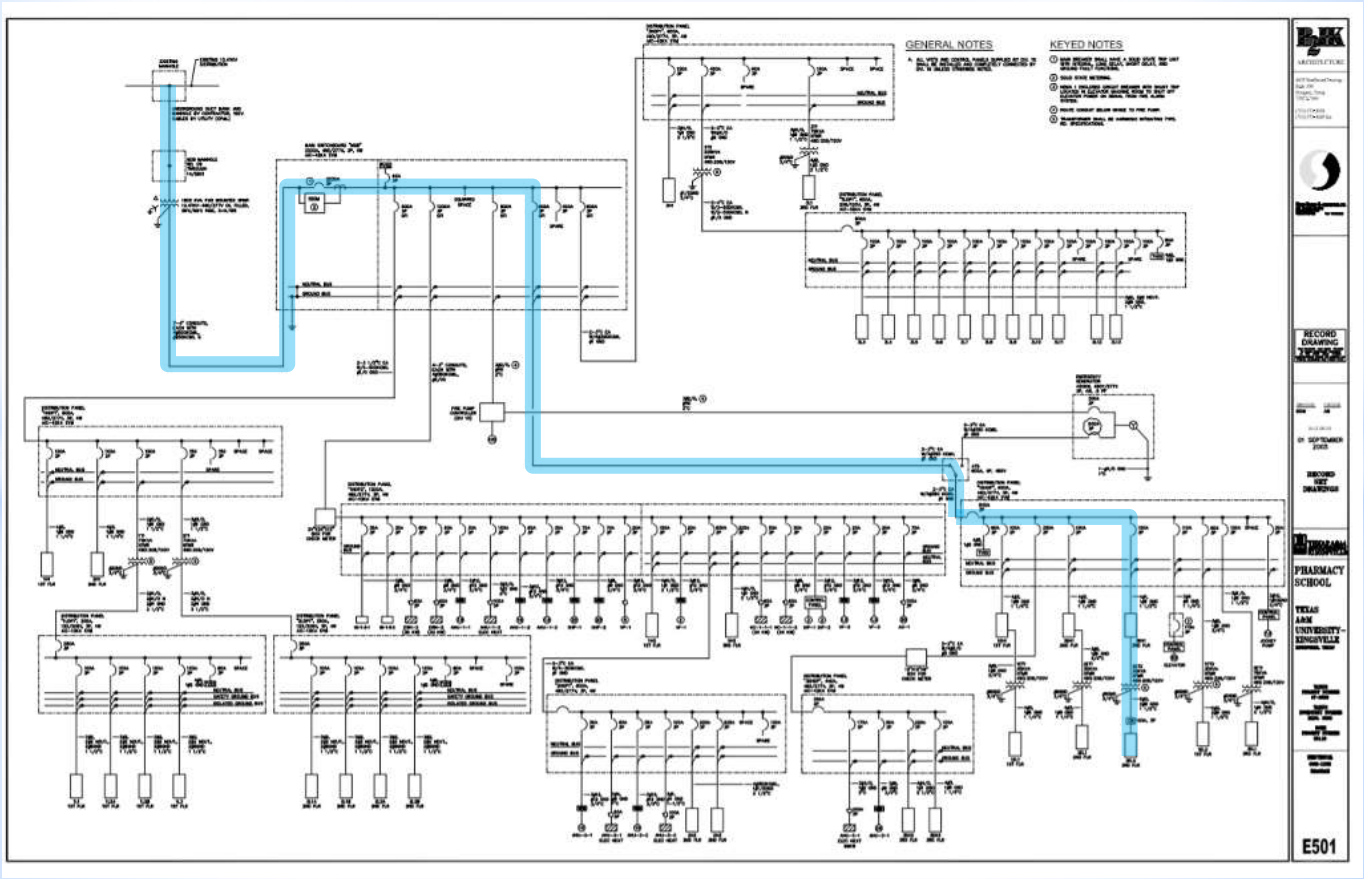
PANEL COVERAGE Diagram

Shows area served by each breaker panel in a riser format



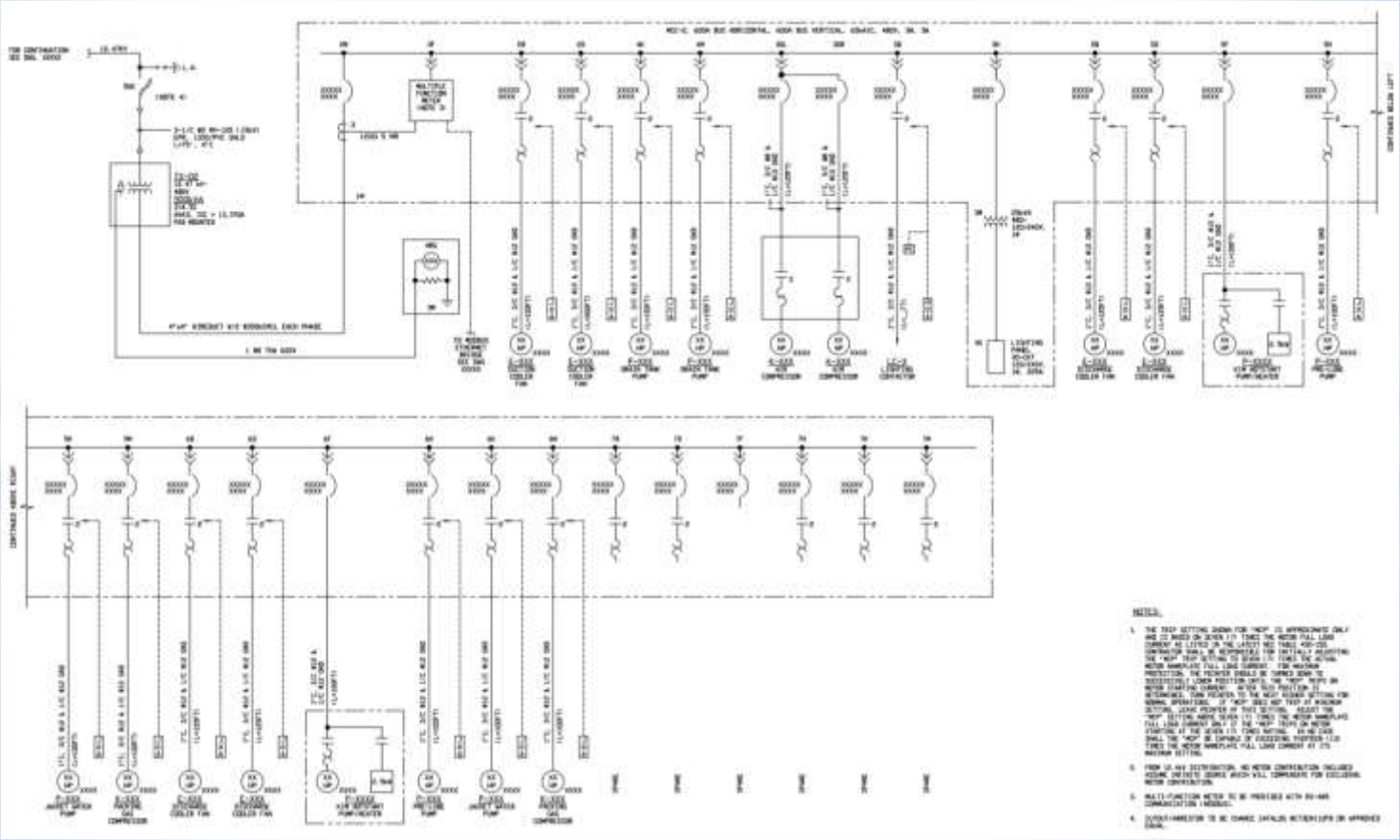
Electrical 1-Line Diagrams

Top Down Layout



Electrical 1-Line Diagrams

Specialty Symbols



Electrical 1-Line Diagrams

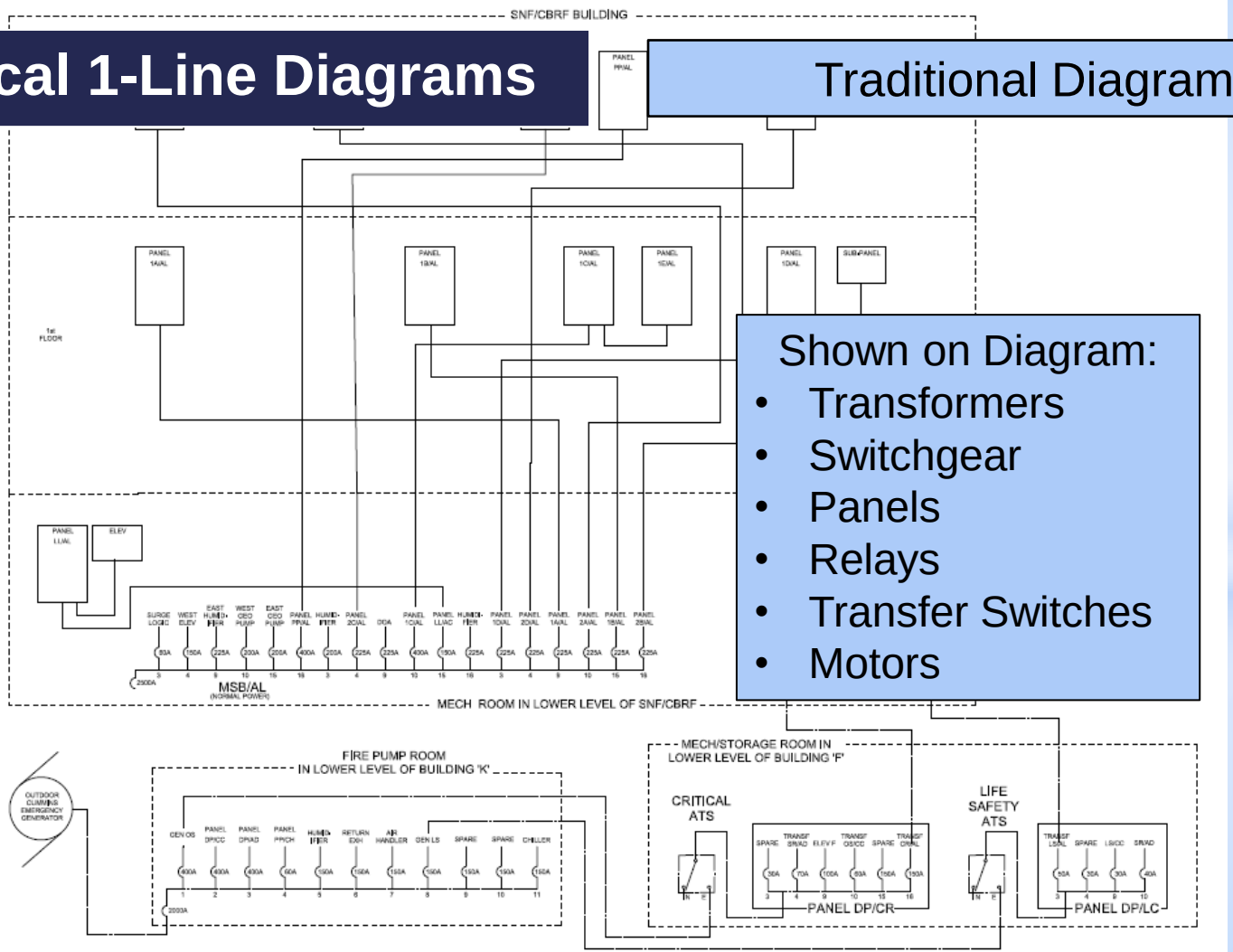
Shows how panels are powered

- **Normal Power**
- **Emergency Power**

Caution: 1-Lines are NOT normally kept up to date, especially if there's a lot of additions

Electrical 1-Line Diagrams

Traditional Diagram

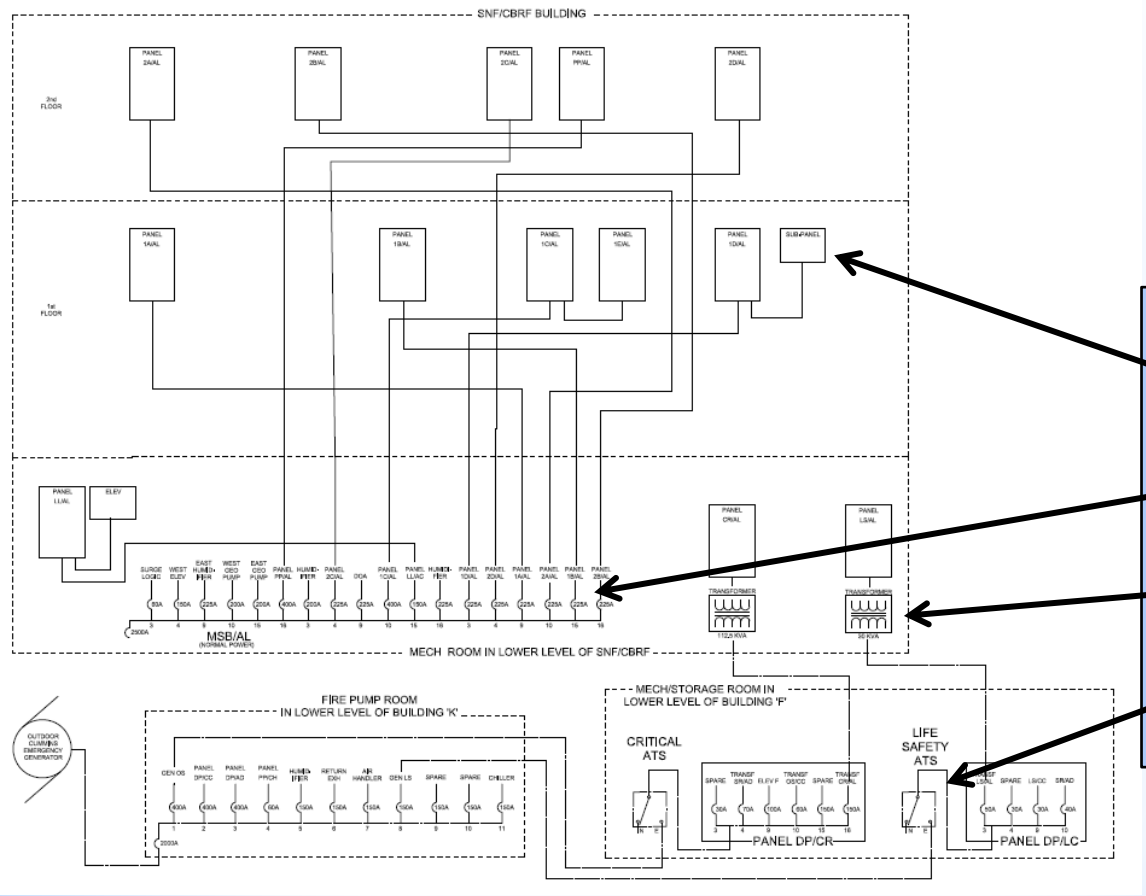


Shown on Diagram:

- Transformers
- Switchgear
- Panels
- Relays
- Transfer Switches
- Motors

Electrical 1-Line Diagrams

Symbols



Elect Panel

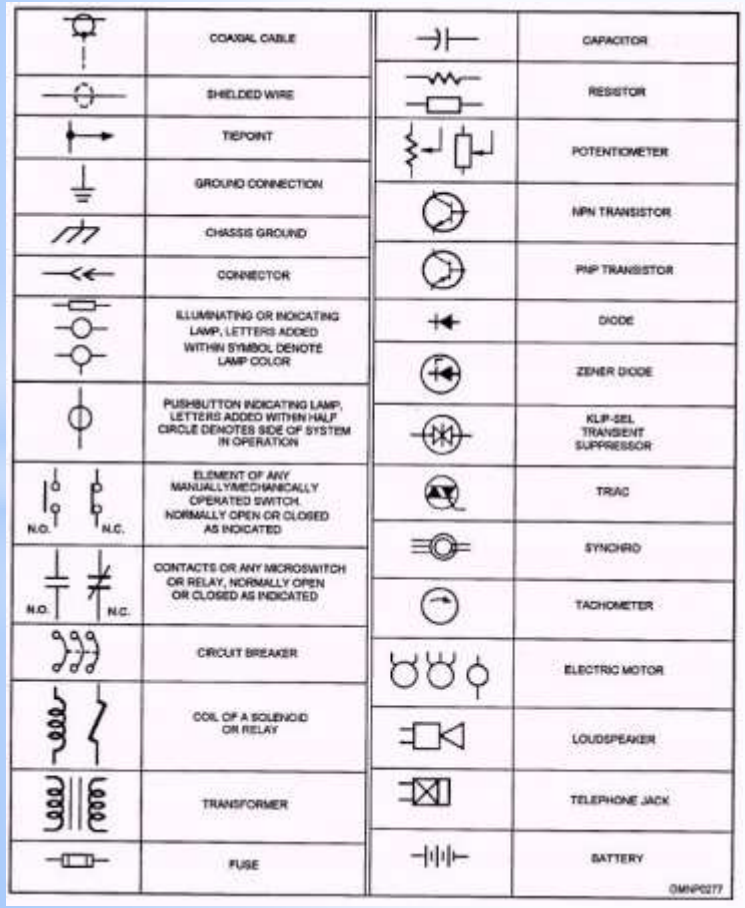
225A **Breaker**

Transformer

Auto Transfer Switch

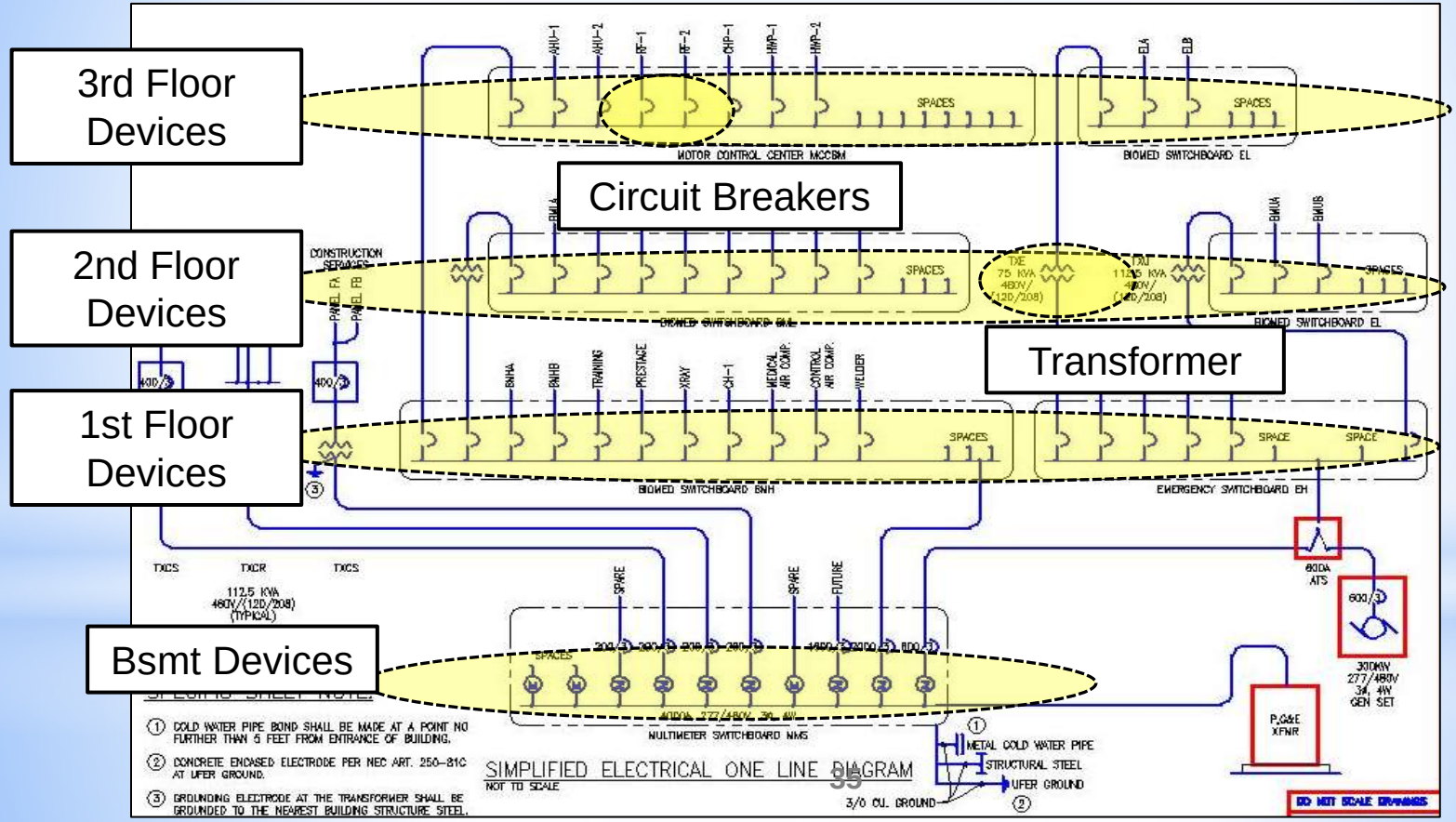
Electrical 1-Line Diagrams

Symbols

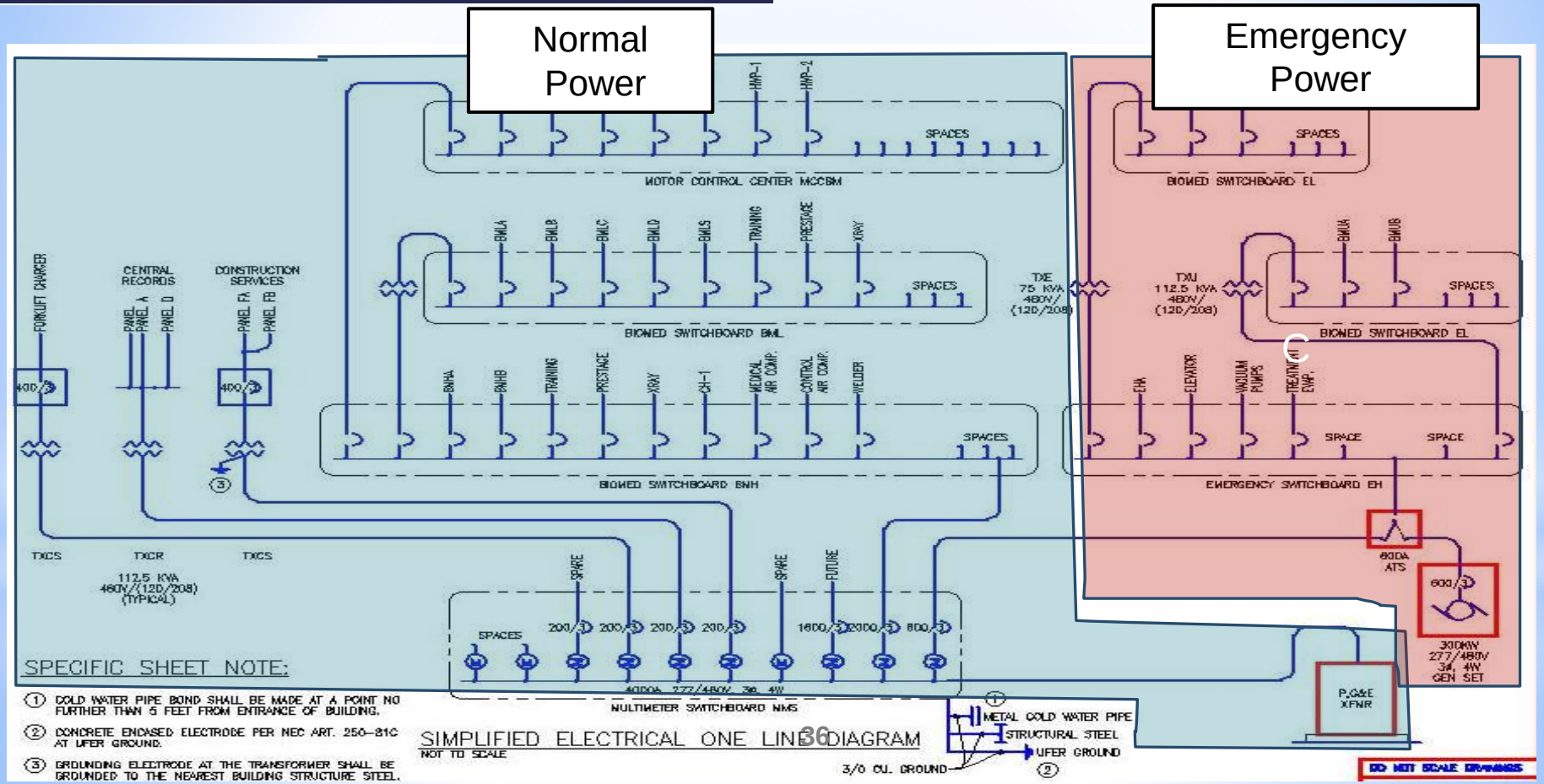


NO universally accepted set of symbols

Electrical 1-Line Diagrams

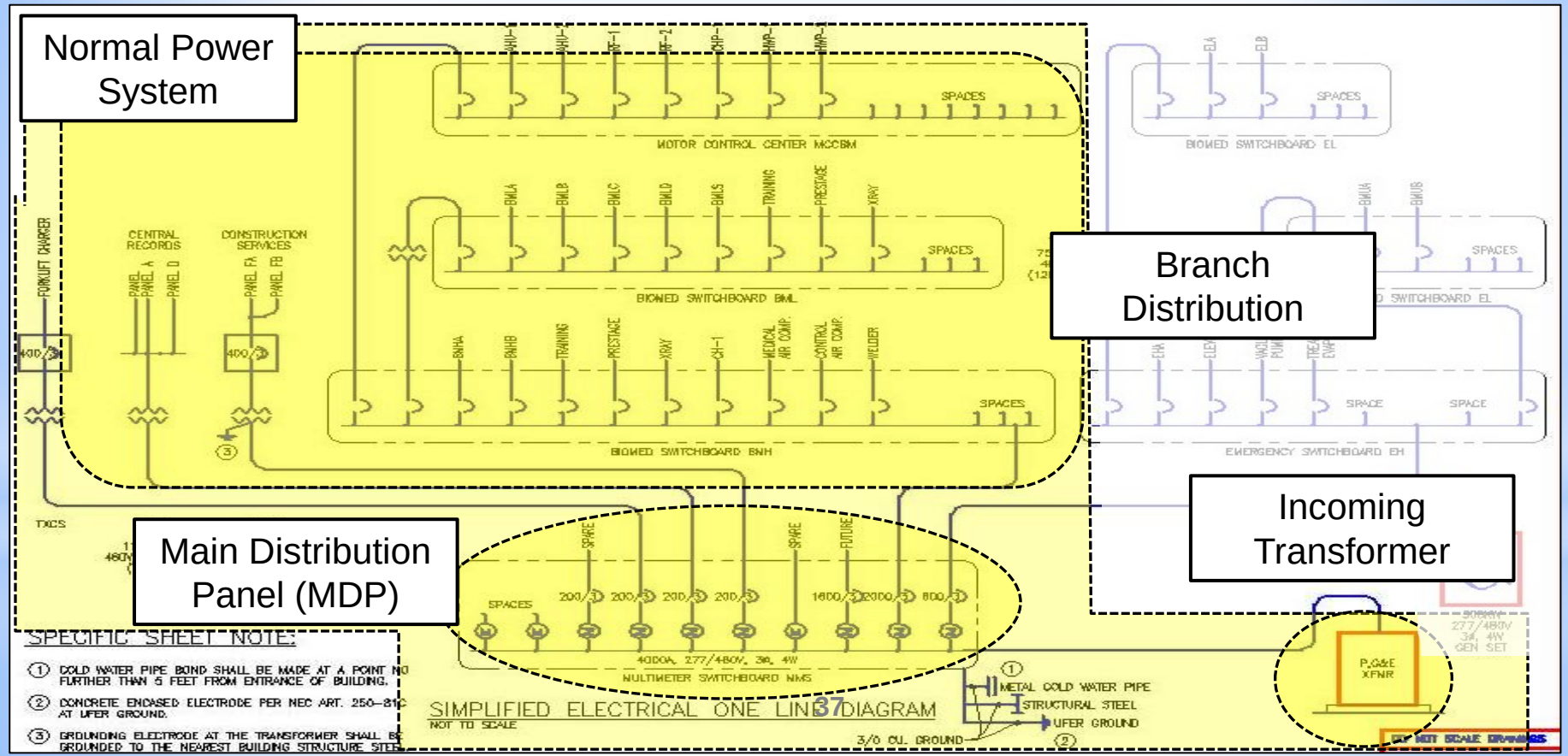


Electrical 1-Line Diagrams



Electrical 1-Line Diagrams

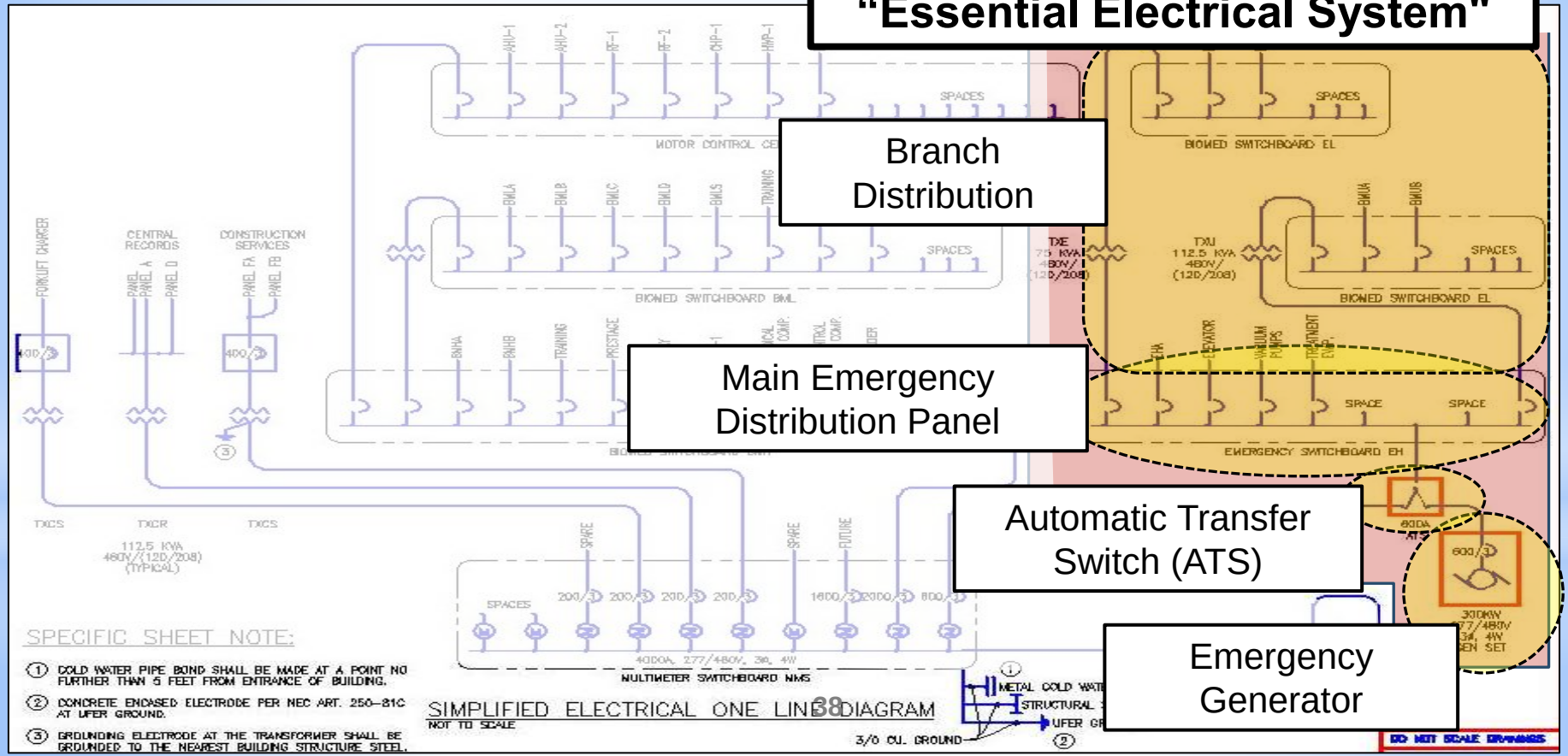
NORMAL Power



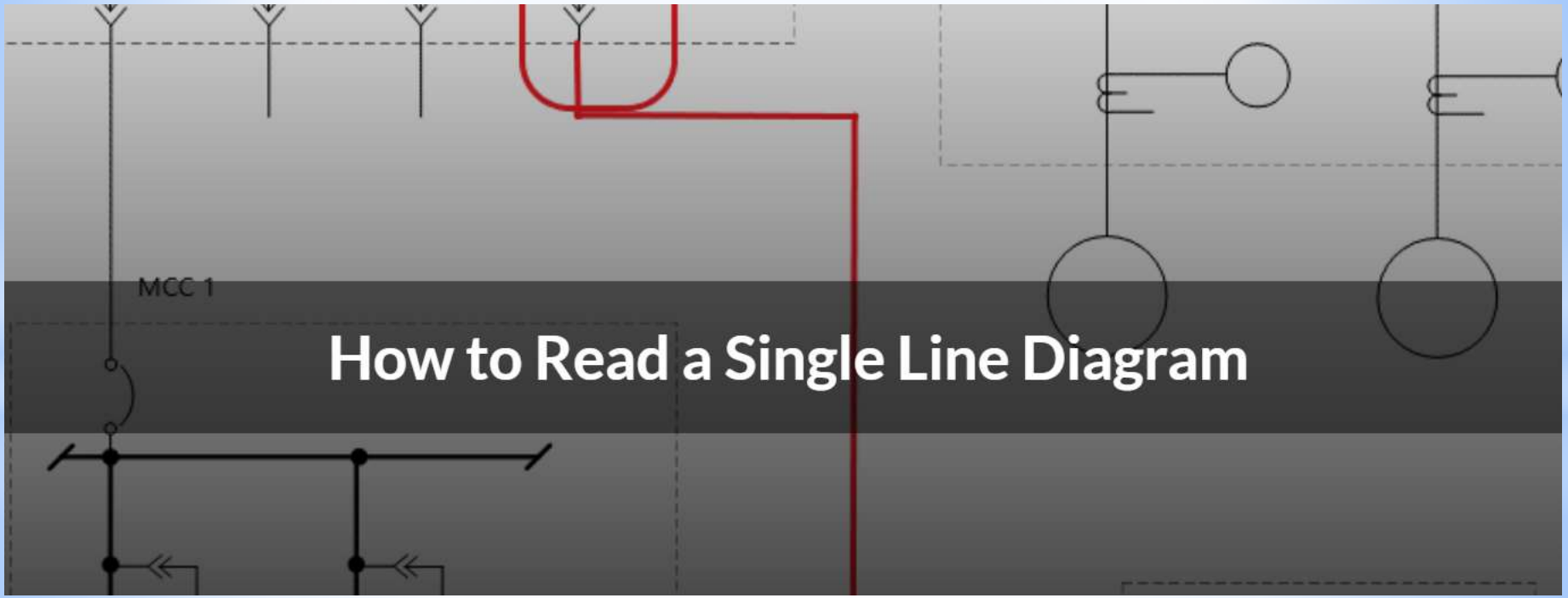
Electrical 1-Line Diagrams

EMERGENCY Power

“Essential Electrical System"

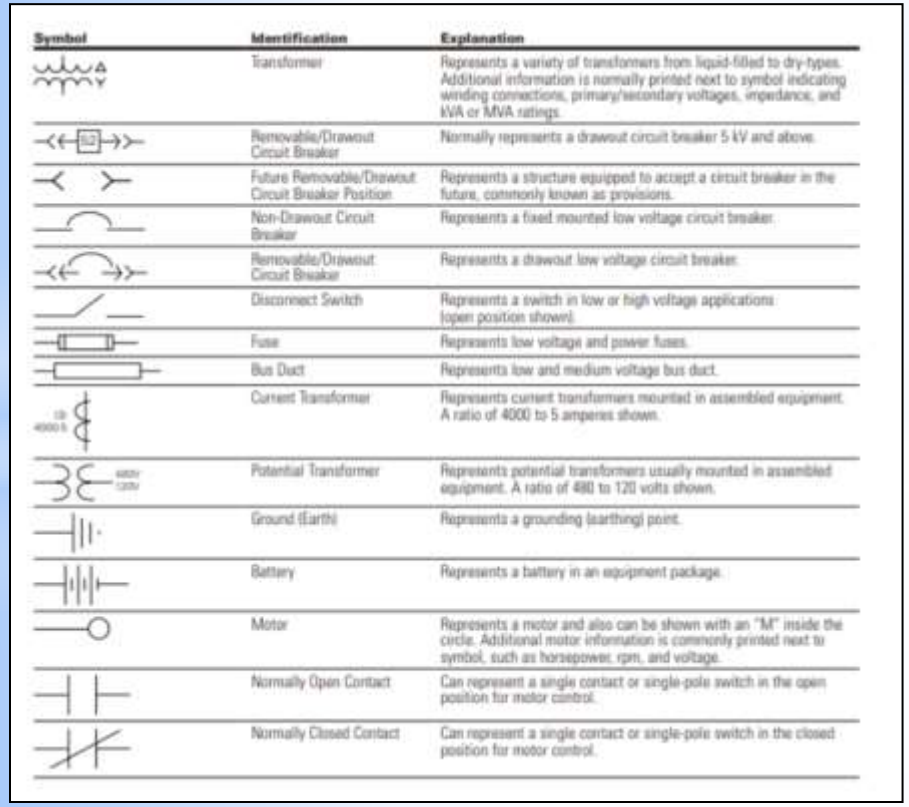


Electrical 1-Line Diagrams



Electrical 1-Line Diagrams

How to read a 1-line electrical



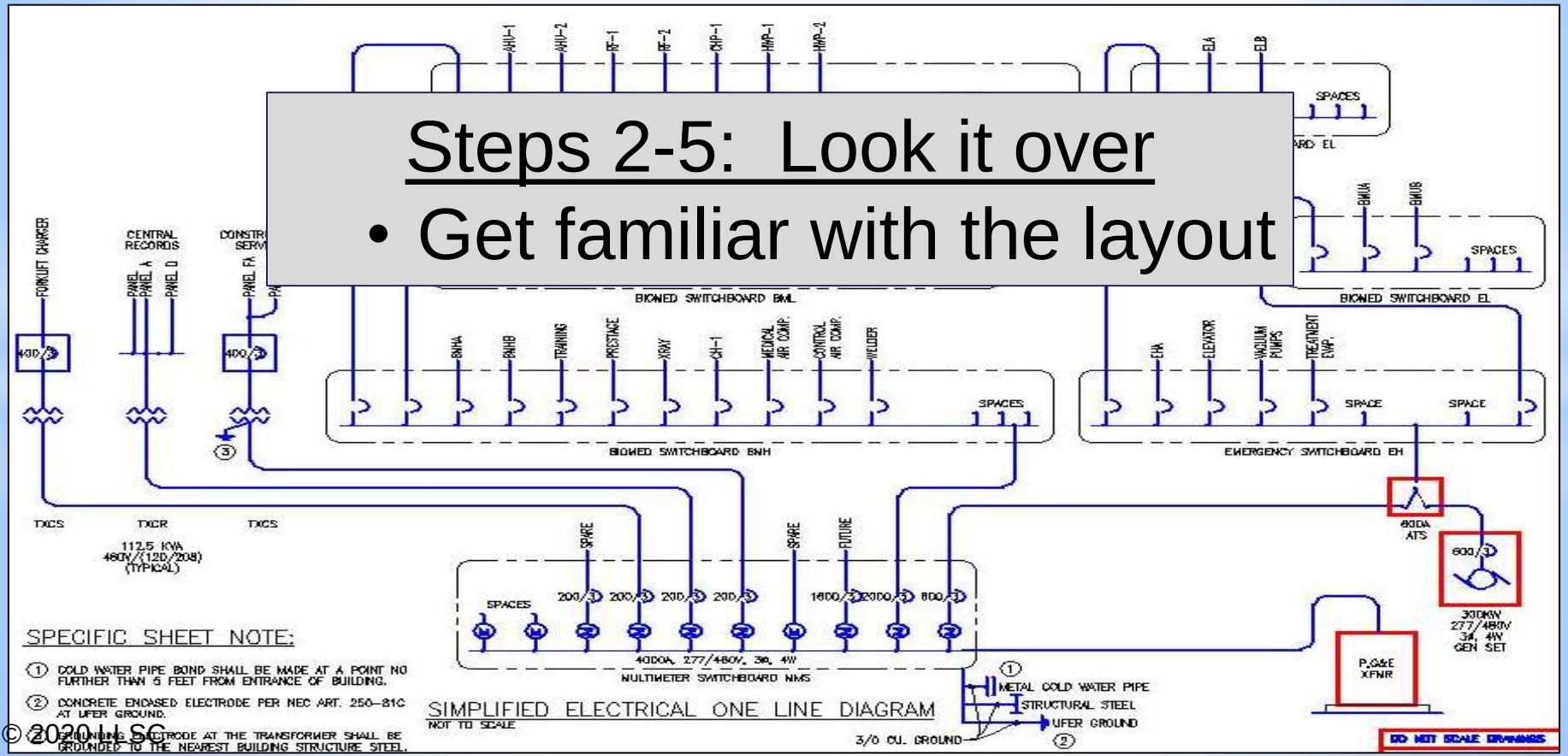
Symbol	Identification	Explanation
	Transformer	Represents a variety of transformers from liquid-filled to dry-types. Additional information is normally printed next to symbol indicating winding connections, primary/secondary voltages, impedance, and kVA or MVA ratings.
	Removable/Drawout Circuit Breaker	Normally represents a drawout circuit breaker 5 kV and above.
	Future Removable/Drawout Circuit Breaker Position	Represents a structure equipped to accept a circuit breaker in the future, commonly known as provisions.
	Non-Drawout Circuit Breaker	Represents a fixed mounted low voltage circuit breaker.
	Removable/Drawout Circuit Breaker	Represents a drawout low voltage circuit breaker.
	Disconnect Switch	Represents a switch in low or high voltage applications (open position shown).
	Fuse	Represents low voltage and power fuses.
	Bus Duct	Represents low and medium voltage bus duct.
	Current Transformer	Represents current transformers mounted in assembled equipment. A ratio of 4000 to 5 amperes shown.
	Potential Transformer	Represents potential transformers usually mounted in assembled equipment. A ratio of 480 to 120 volts shown.
	Ground (Earth)	Represents a grounding (earthing) point.
	Battery	Represents a battery in an equipment package.
	Motor	Represents a motor and also can be shown with an "M" inside the circle. Additional motor information is commonly printed next to symbol, such as horsepower, rpm, and voltage.
	Normally Open Contact	Can represent a single contact or single-pole switch in the open position for motor control.
	Normally Closed Contact	Can represent a single contact or single-pole switch in the closed position for motor control.

Step 1: Consult the Legend

- Confirms the utility
- Shows the meaning of symbols on diagram

Electrical 1-Line Diagrams

How to read a 1-line electrical

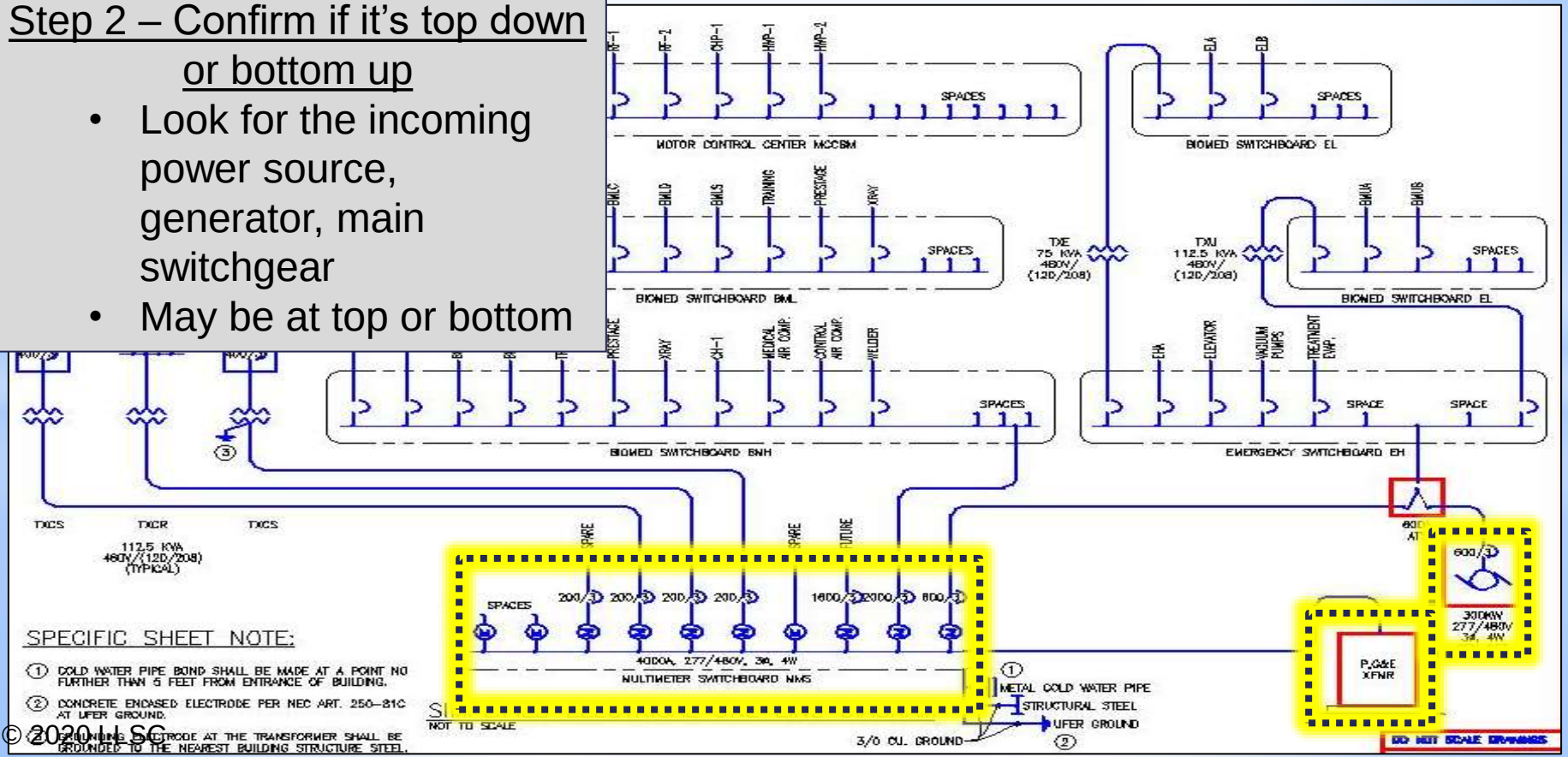


Electrical 1-Line Diagrams

How to read a 1-line electrical

Step 2 – Confirm if it's top down or bottom up

- Look for the incoming power source, generator, main switchgear
- May be at top or bottom

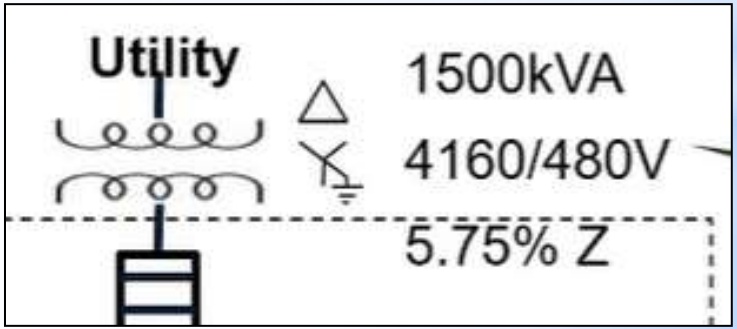


Electrical 1-Line Diagrams

How to read a 1-line electrical

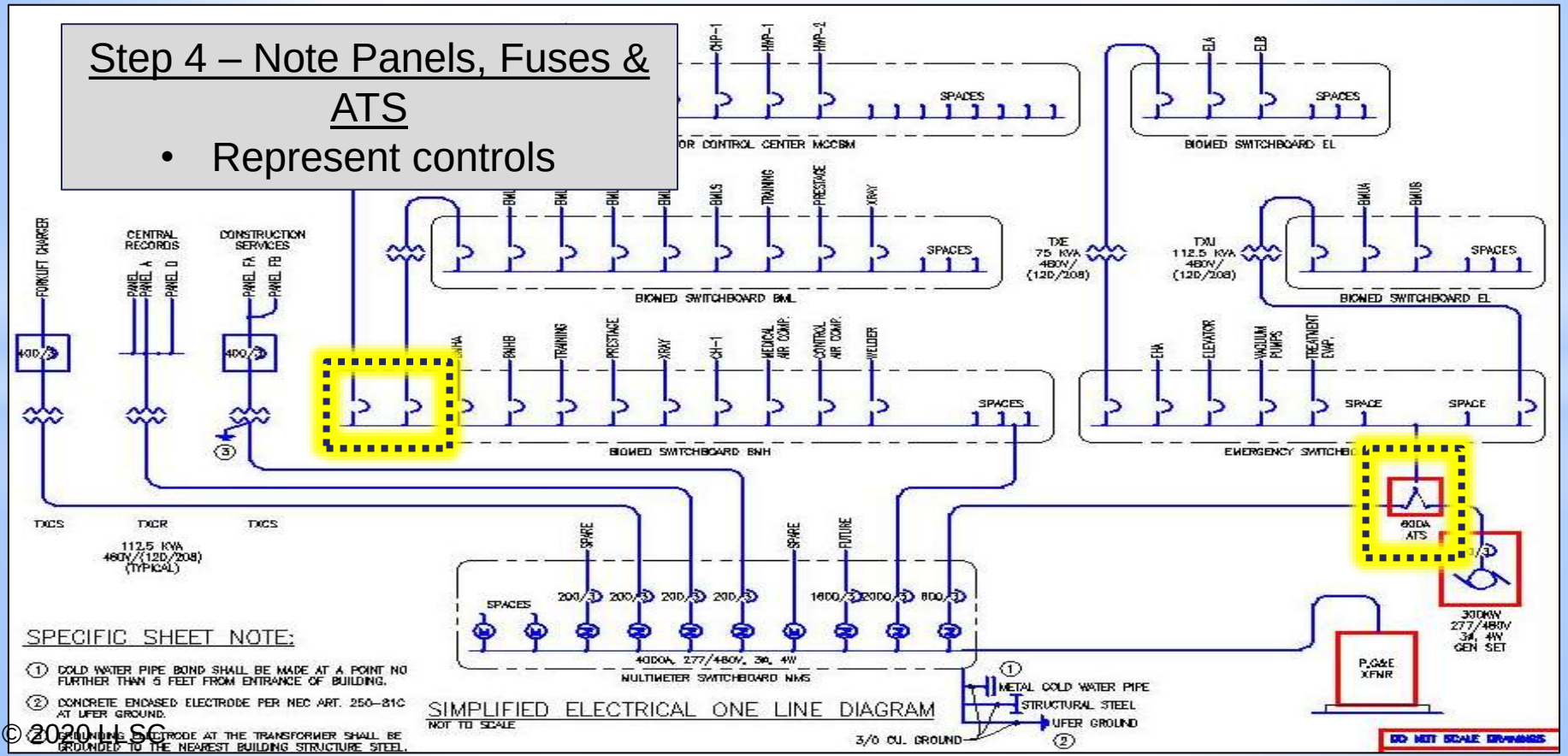
Step 3 – Note Transformers

- Represent changes of voltage ‘downstream’



Electrical 1-Line Diagrams

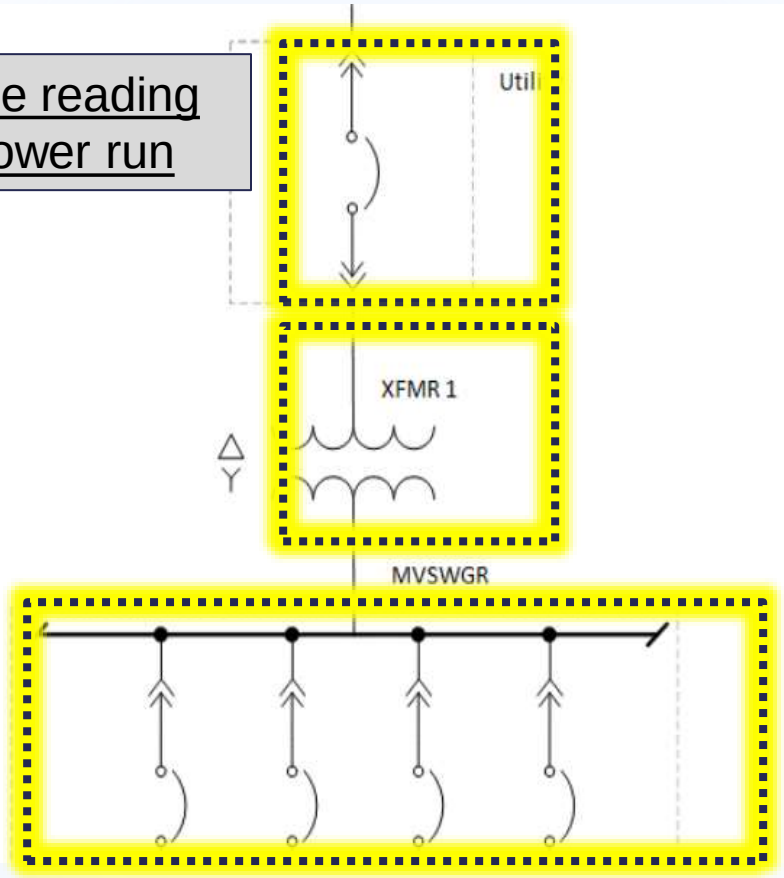
How to read a 1-line electrical



Electrical 1-Line Diagrams

How to read a 1-line electrical

Step 5 – Practice reading by Tracing a power run



Main Incoming Breaker Switch

↓

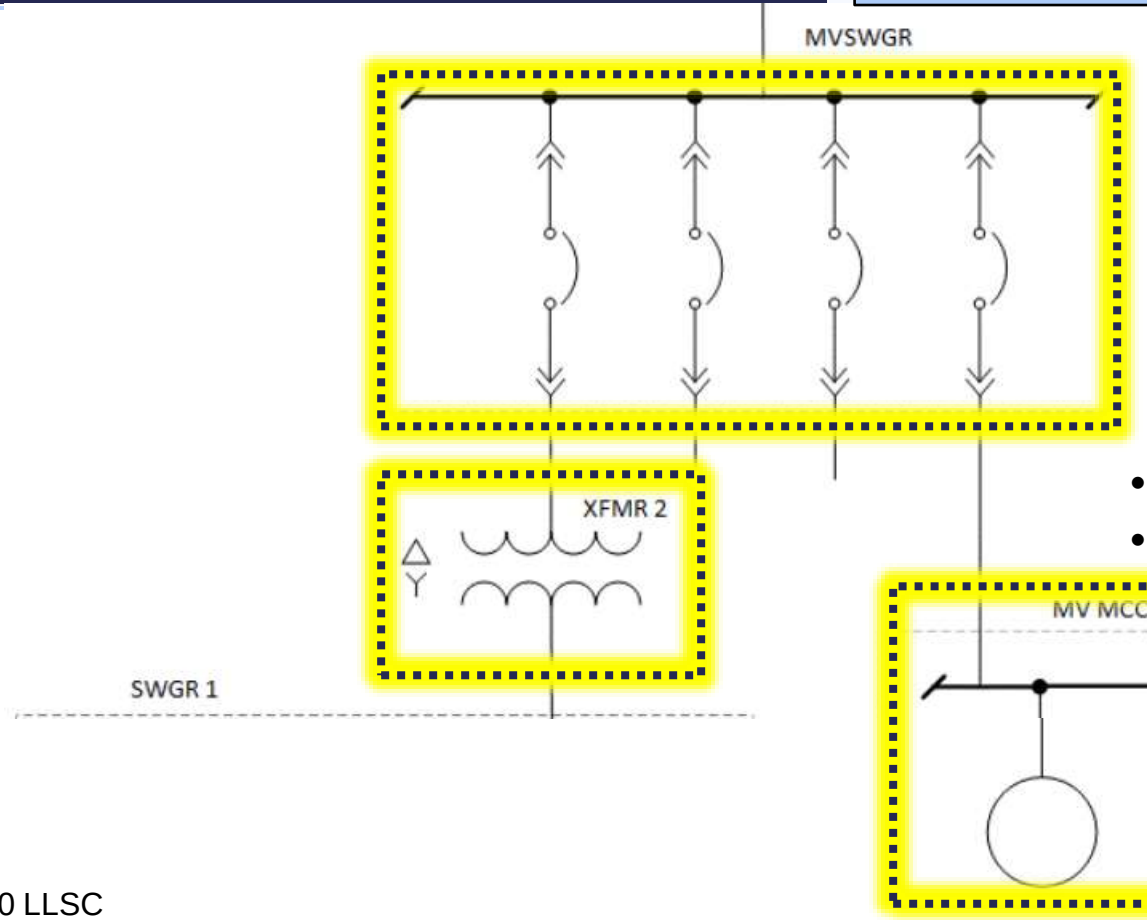
Main Transformer

↓

Main Switchgear

Electrical 1-Line Diagrams

How to read a 1-line electrical

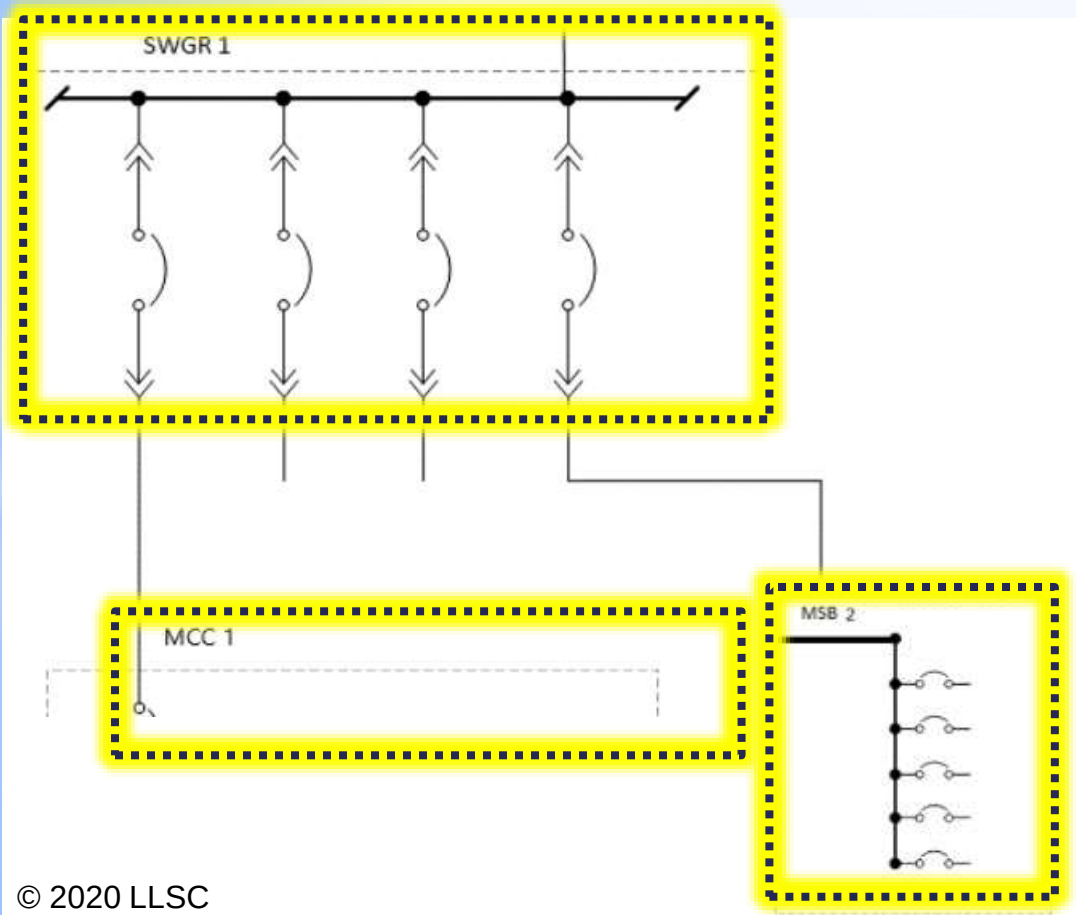


Main Switchgear

- L: Transformer
- R: Motor Control Center

Electrical 1-Line Diagrams

How to read a 1-line electrical

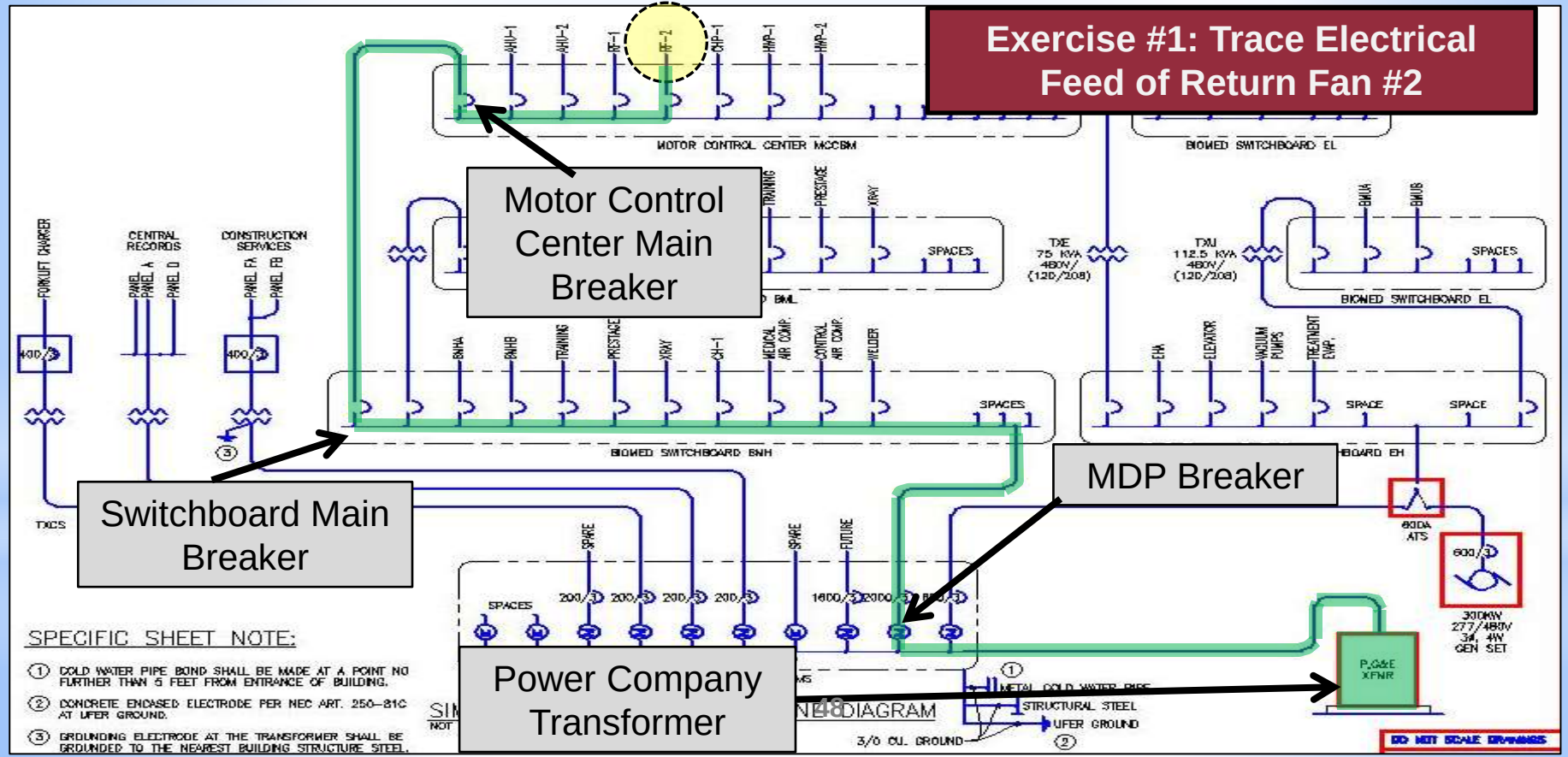


Switchgear

- L: Motor Control Center
- R: Main Switch Board

Electrical 1-Line Diagrams

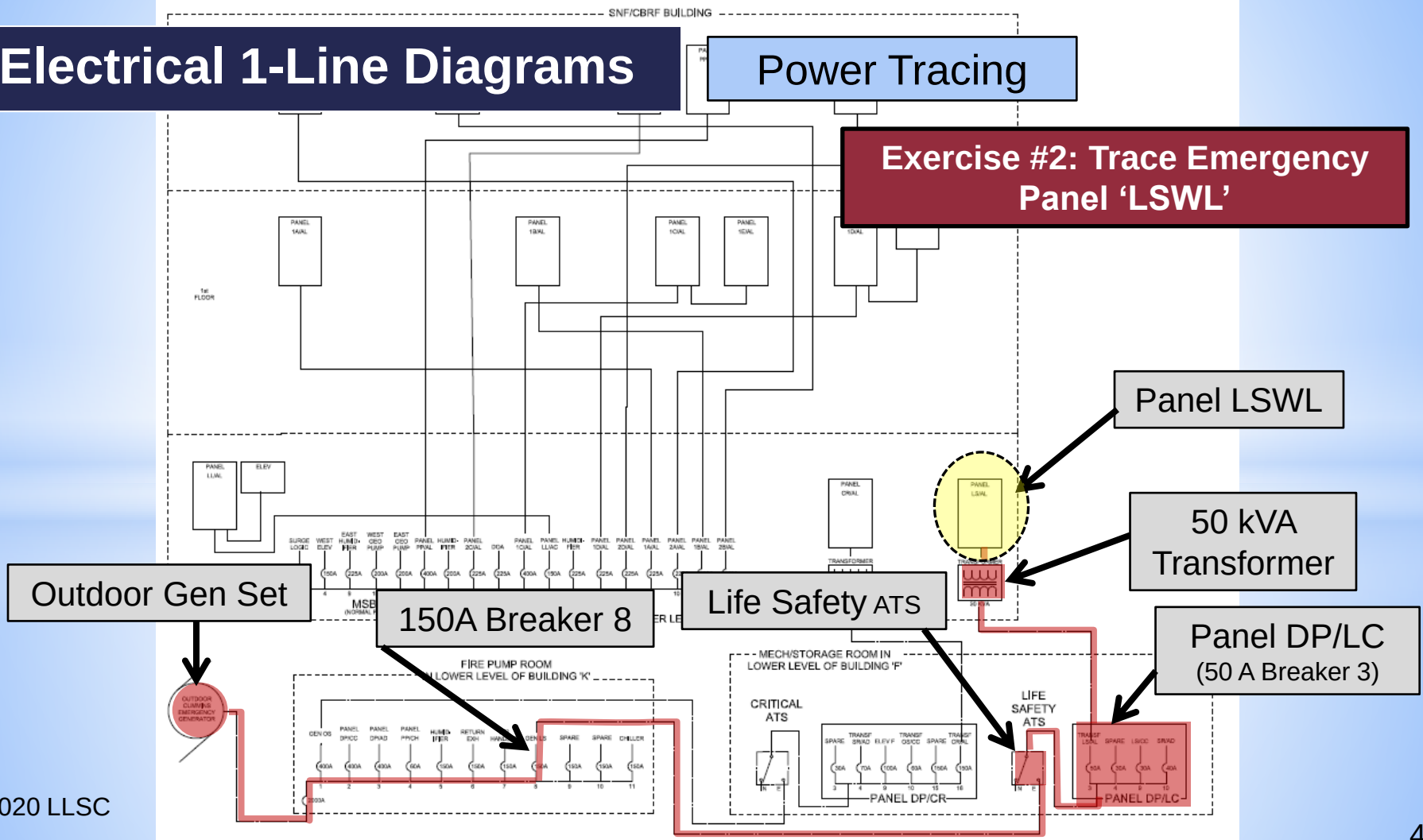
Power Tracing



Electrical 1-Line Diagrams

Power Tracing

Exercise #2: Trace Emergency Panel 'LSWL'



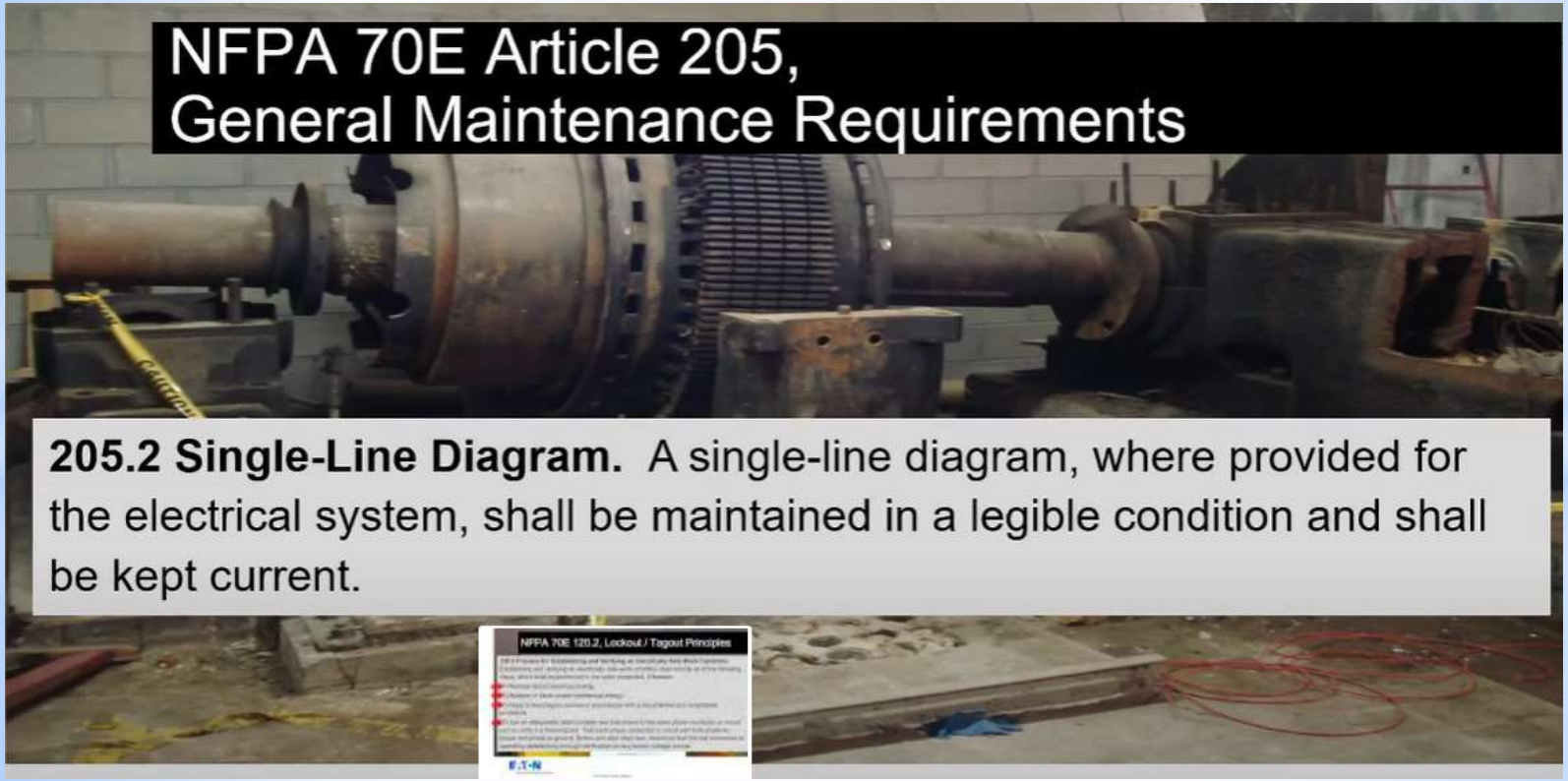
Electrical 1-Line Diagrams

Where do I get a 1-line ?

1. For equipment: from manufacturer
2. For building: from electrical designer
3. For building: draw yourself

Electrical 1-Line Diagrams

Keep it Up-to-Date



Electrical 1-Line Diagrams

Updating

1. Request your electrical designer update your 1-line every time there is a project, regardless of size.

Electrical 1-Line Diagrams

Updating

1. Request your electrical designer update your 1-line every time there is a project, regardless of size.

2. Get an electronic copy of your 1-line and learn to make revisions yourself

Learn how to draw your own
at the end of this presentation

Electrical 1-Line Diagrams

Updating

1. Request your designer update
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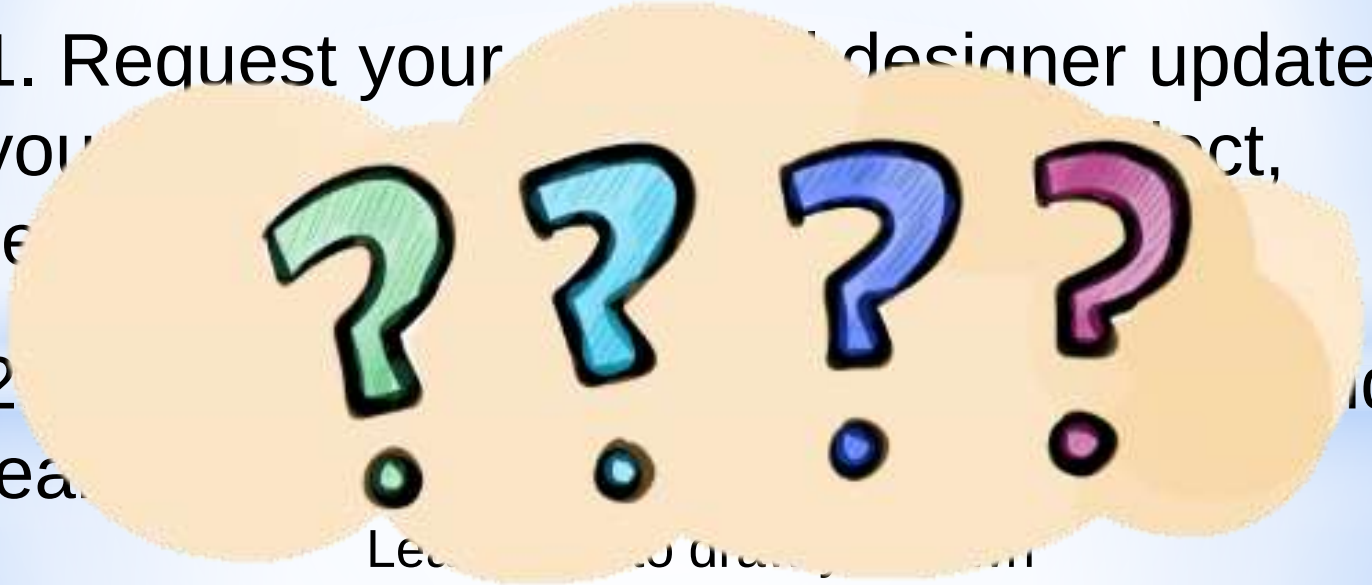

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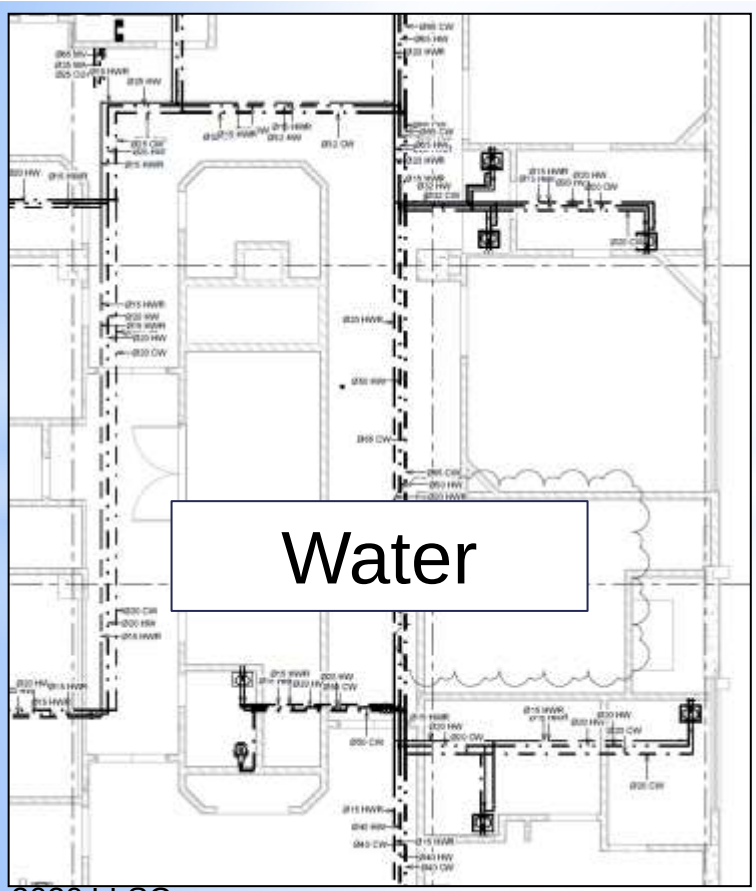
Bill Lauzon

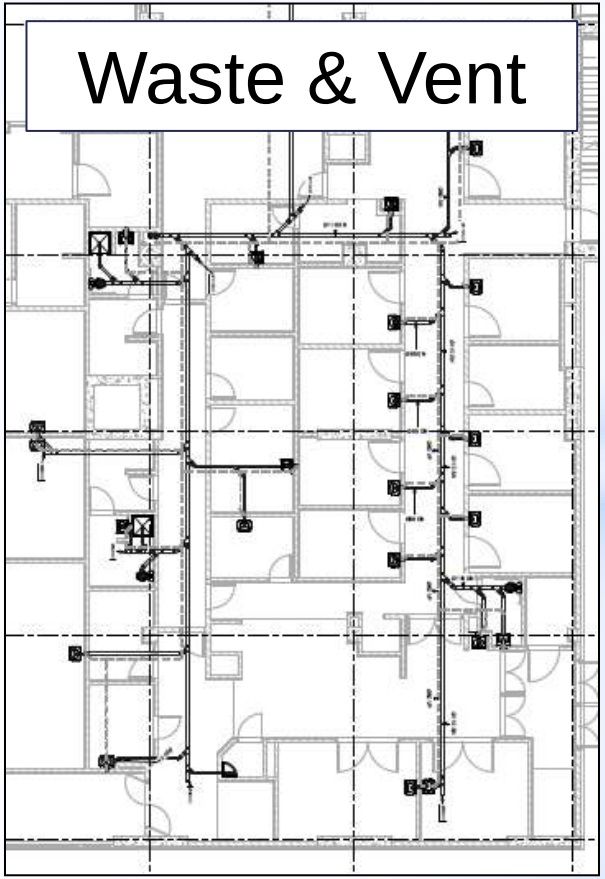
One-Line Diagrams

1. Electrical 1-Lines
2. Plumbing 1-Lines
3. HVAC 1-Lines
4. Med Gas 1-Lines
5. Sprinkler 1-Lines

Plumbing 1-Line Diagrams

Floor Plans

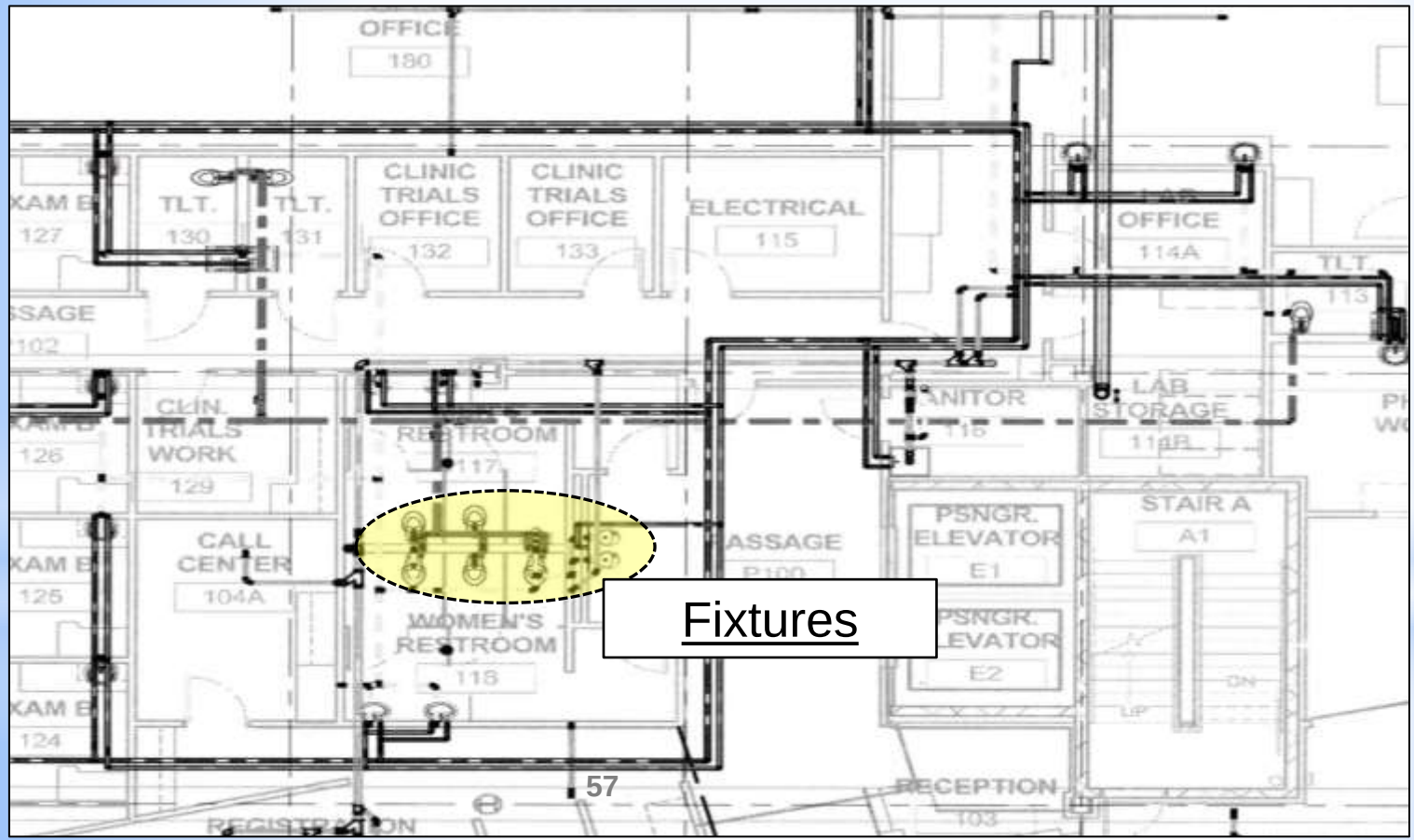




Basic drawings included with all plumbing plans

Plumbing 1-Line Diagrams

Floor Plan



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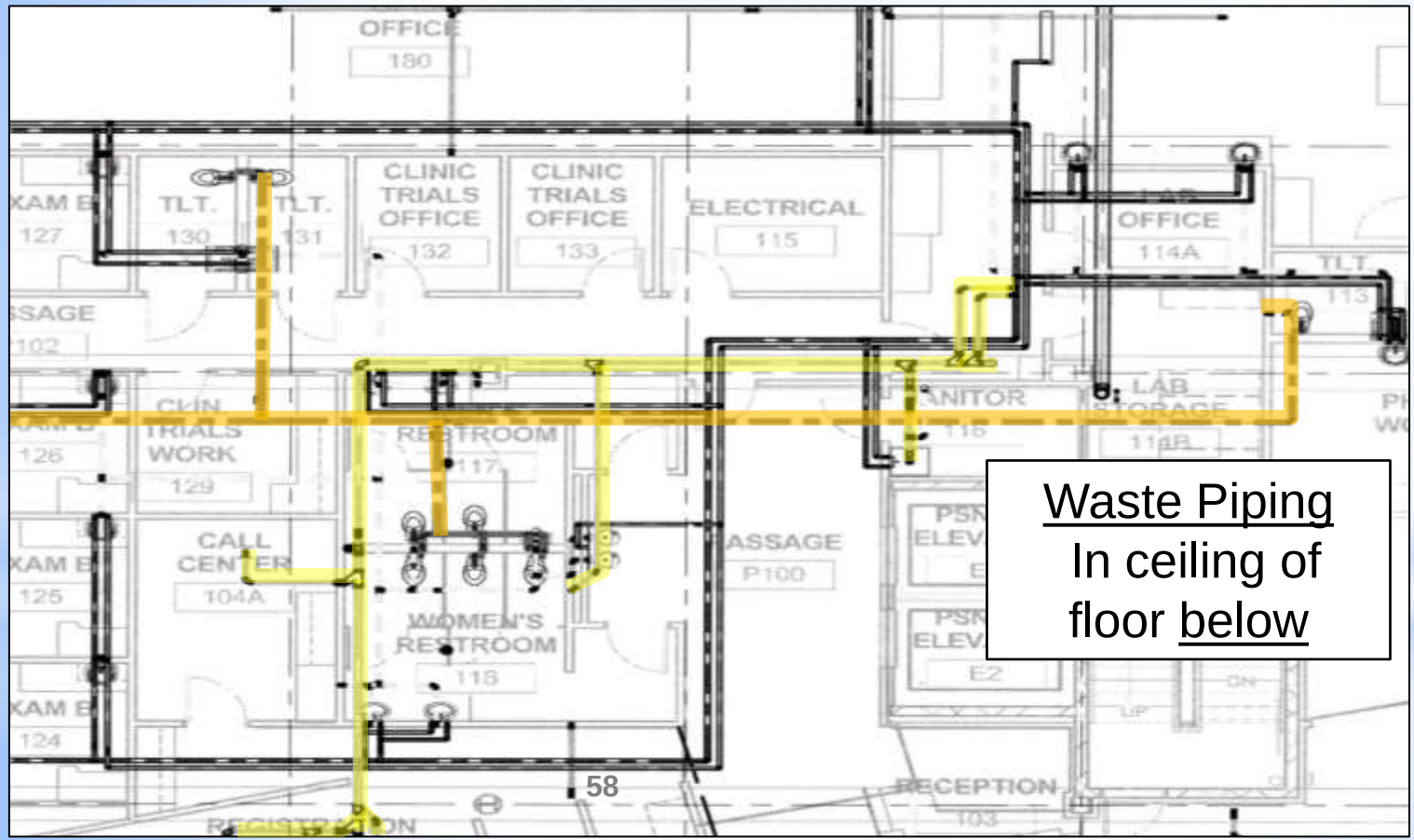
Plumbing 1-Line Diagrams

Floor Plan

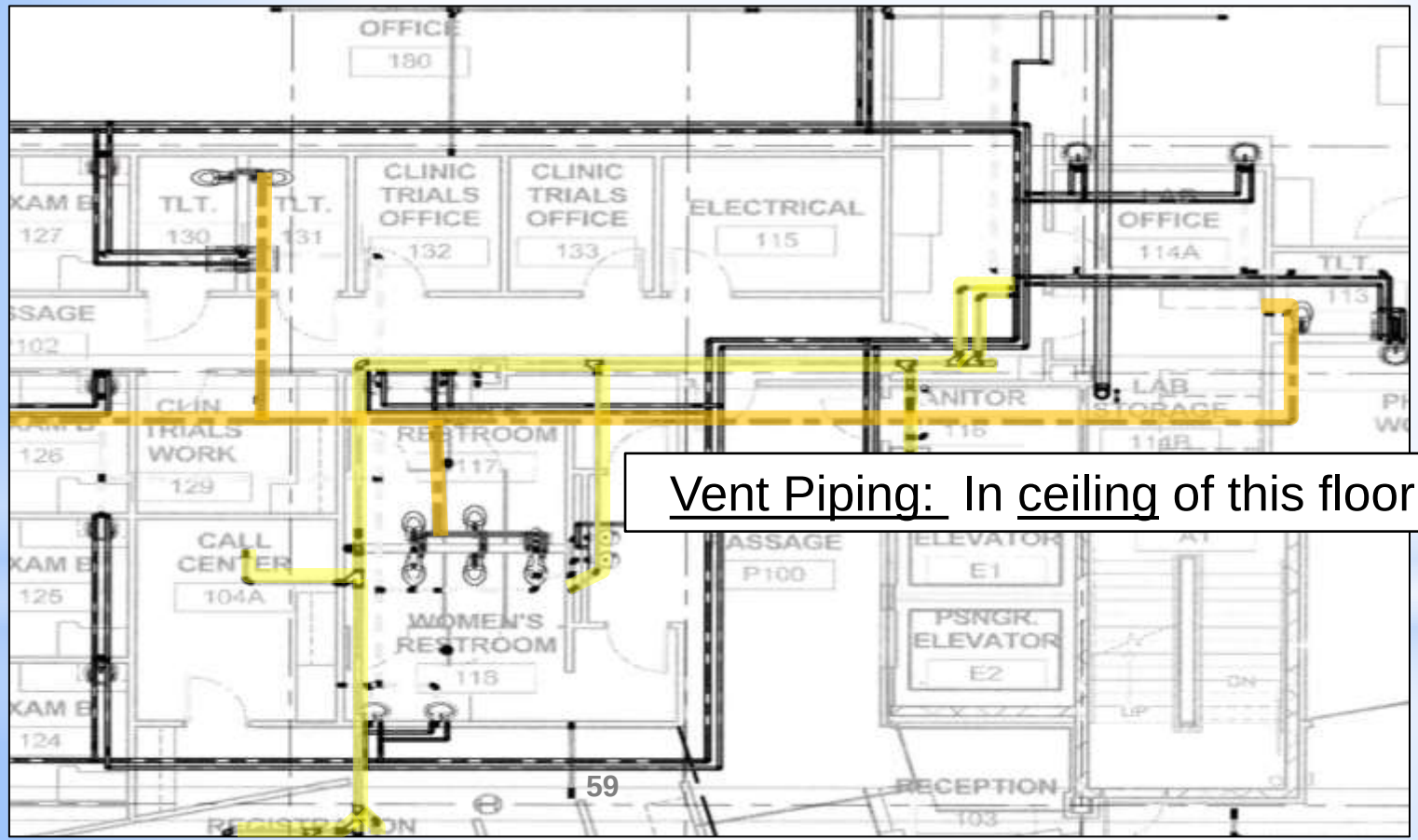


Waste Piping
In ceiling of floor below

Confusing, since physical location are on **different** floors

Plumbing 1-Line Diagrams

Floor Plan

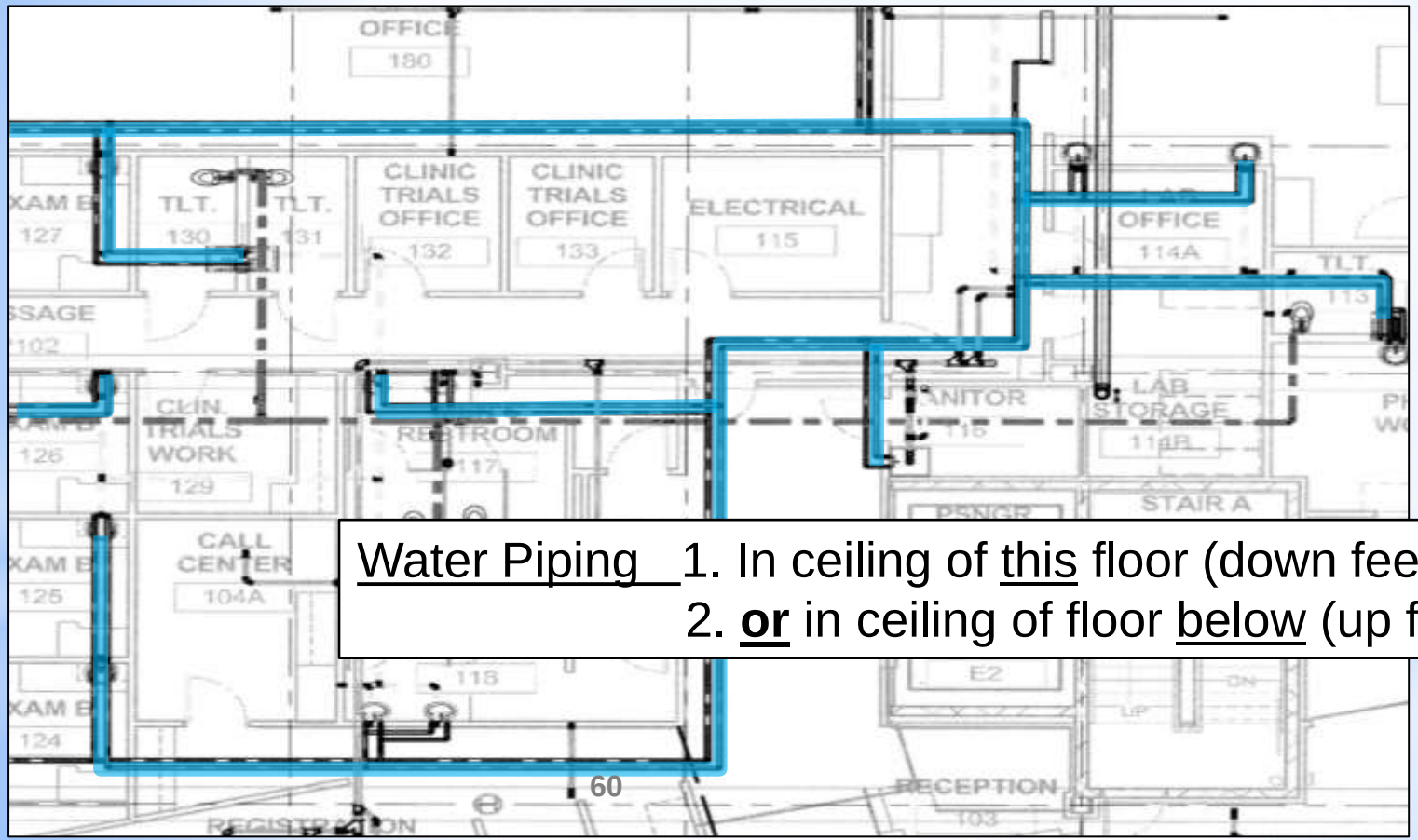


Vent Piping: In ceiling of this floor

Confusing, since physical location are on **different** floors

Plumbing 1-Line Diagrams

Floor Plan



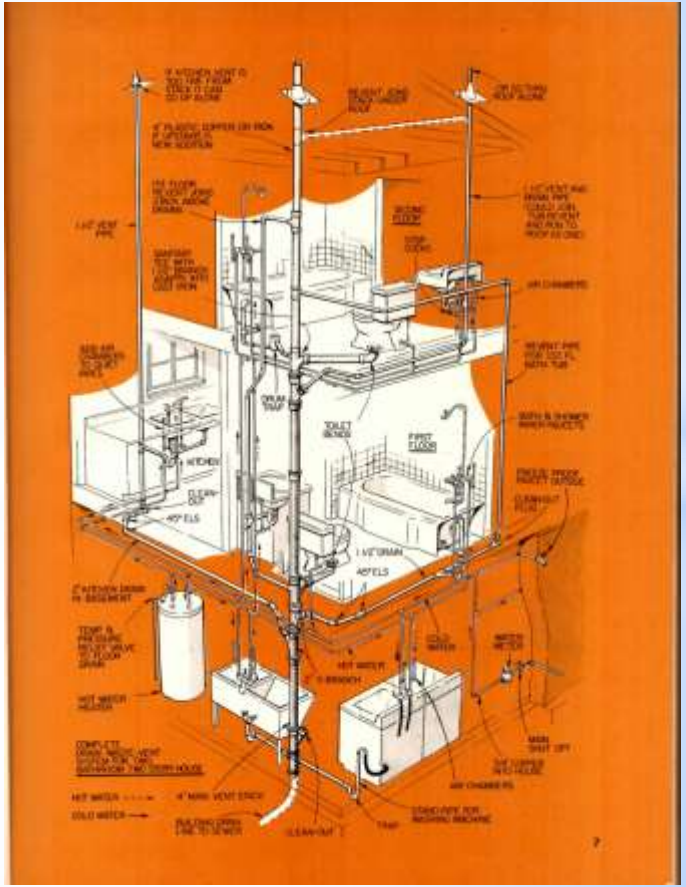
Water Piping 1. In ceiling of this floor (down feed)
2. **or** in ceiling of floor below (up feed)

Confusing, since physical location are on **different** floors

Plumbing 1-Line Diagrams

3D Fixture Isometric

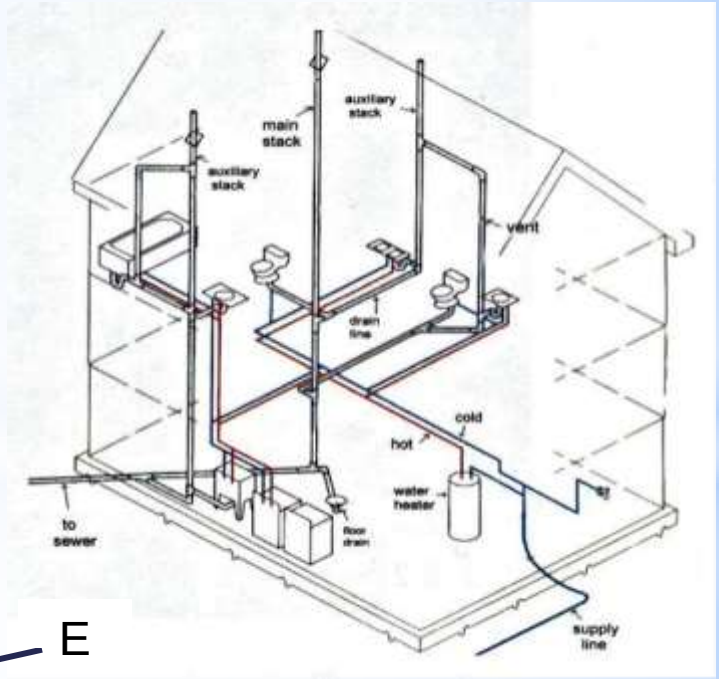
Sometimes, drawings include a 3D view of fixtures & drain piping

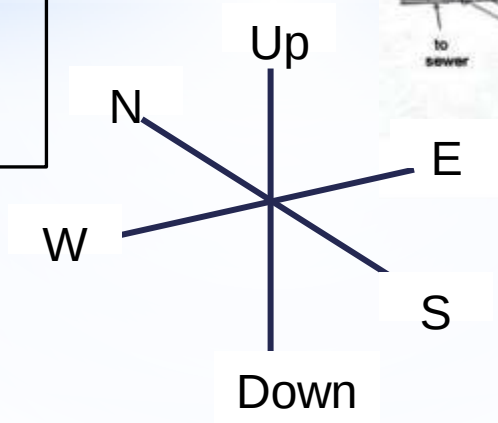


Plumbing 1-Line Diagrams

3D Waste & Vent Isometric

Sometimes, drawings include a 3D view of fixtures & drain piping

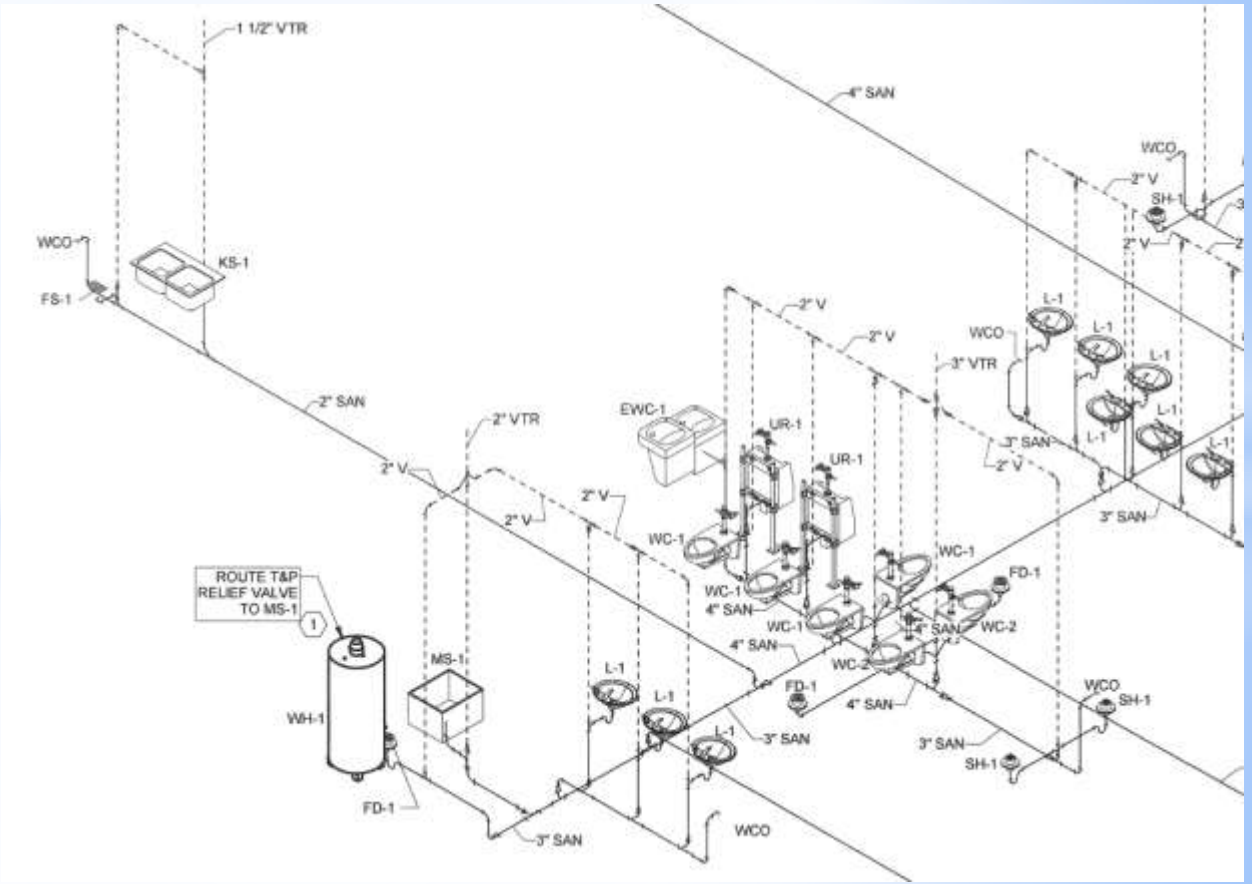




Plumbing 1-Line Diagrams

3D Waste & Vent Isometric

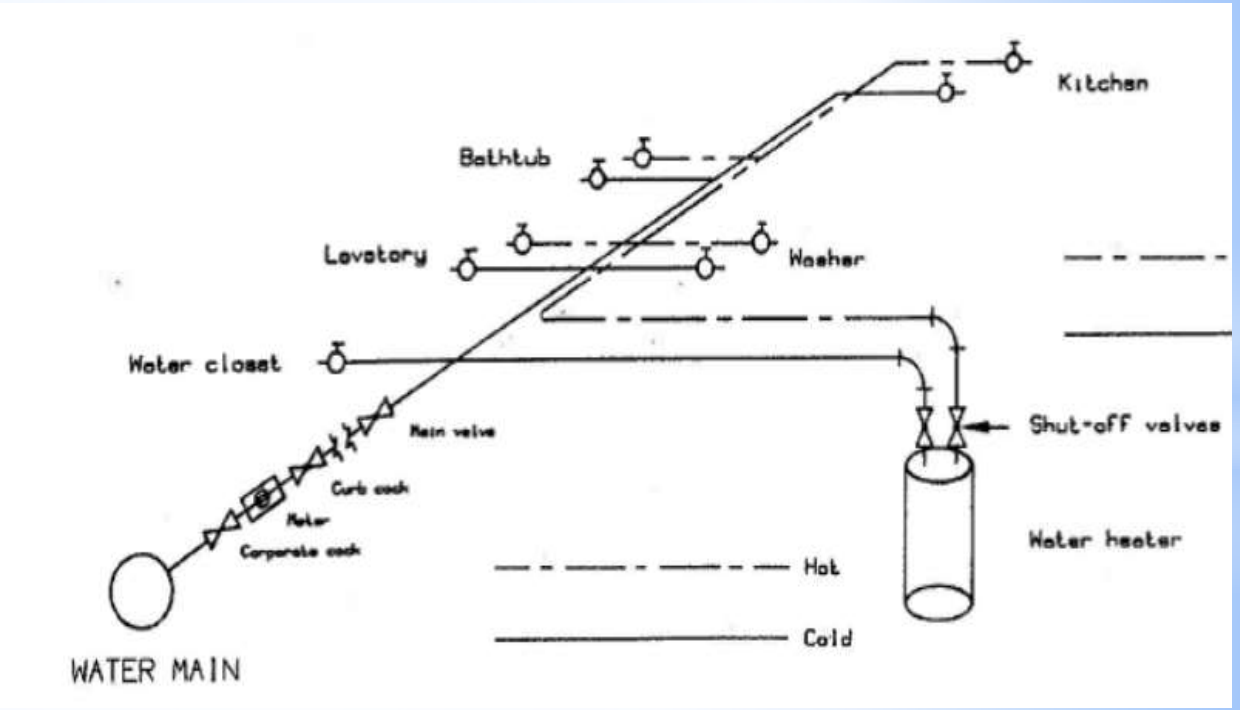
Sometimes, drawings include a 3D view of fixtures & drain piping



Plumbing 1-Line Diagrams

Water Isometric

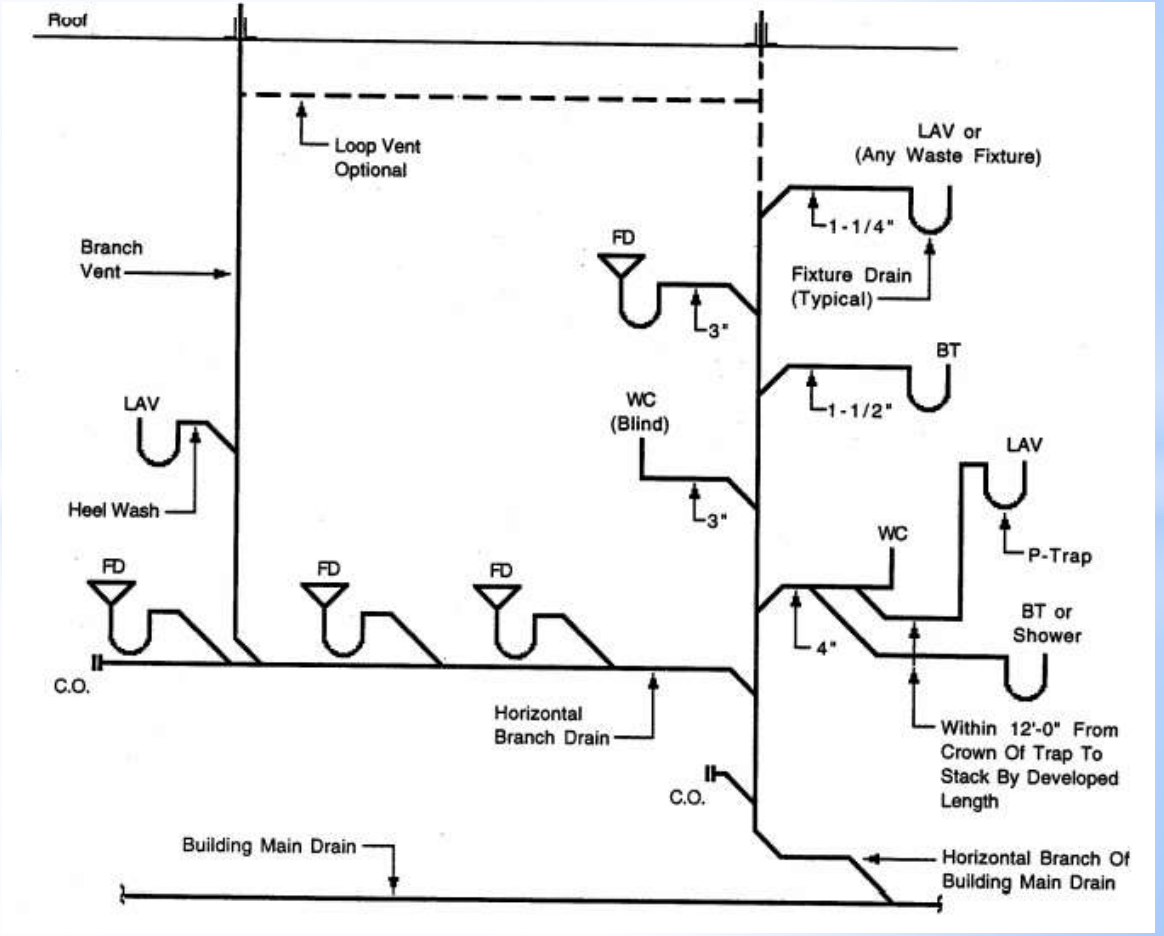
Sometimes, drawings include a 3D view of fixtures & drain piping



Plumbing 1-Line Diagrams

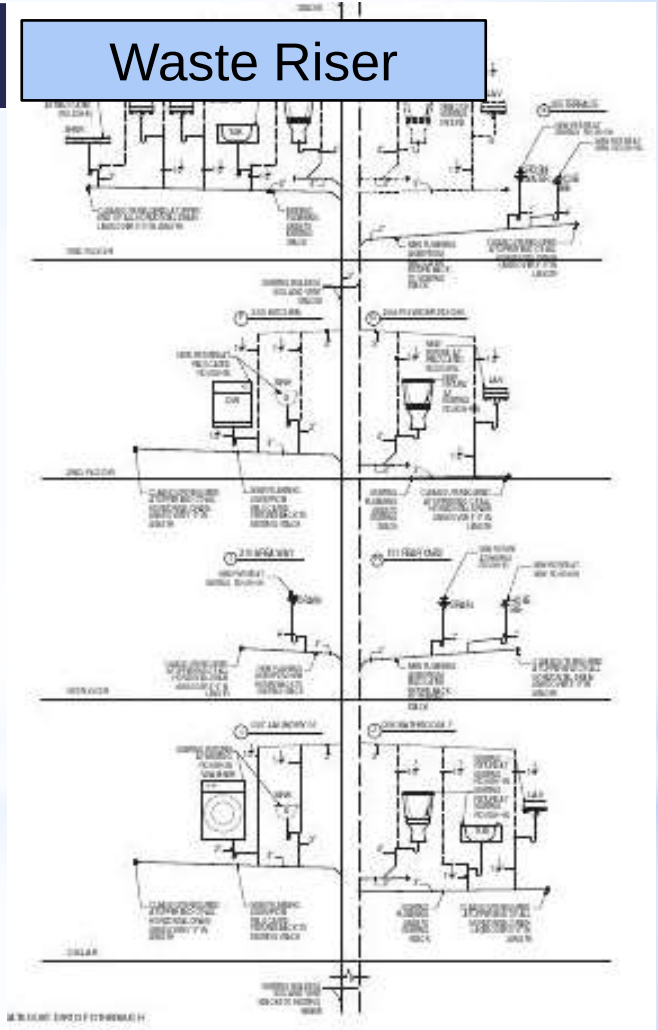
Waste Riser

Rarely, drawings include a riser view of waste piping



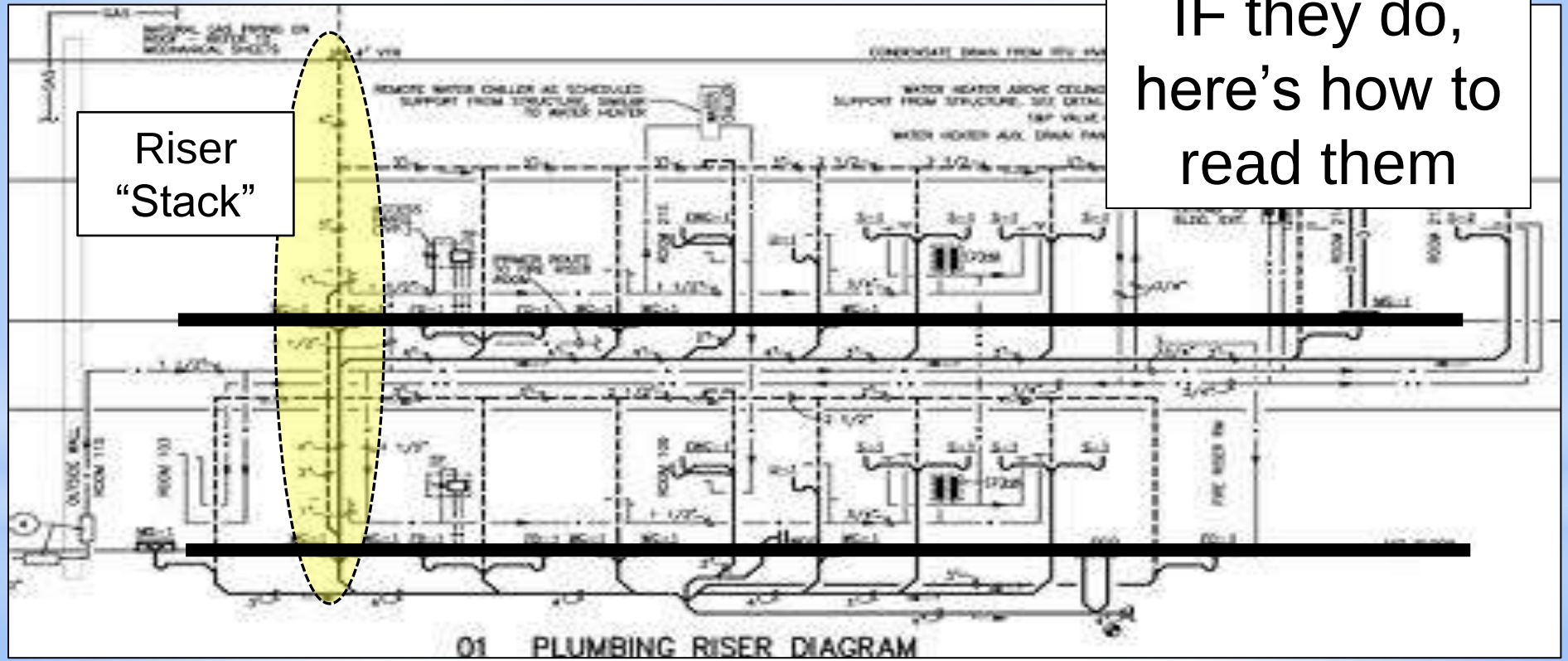
Plumbing 1-Line Diagrams

Rarely, drawings include a riser view of waste piping



Plumbing 1-Line Diagrams

Waste Riser



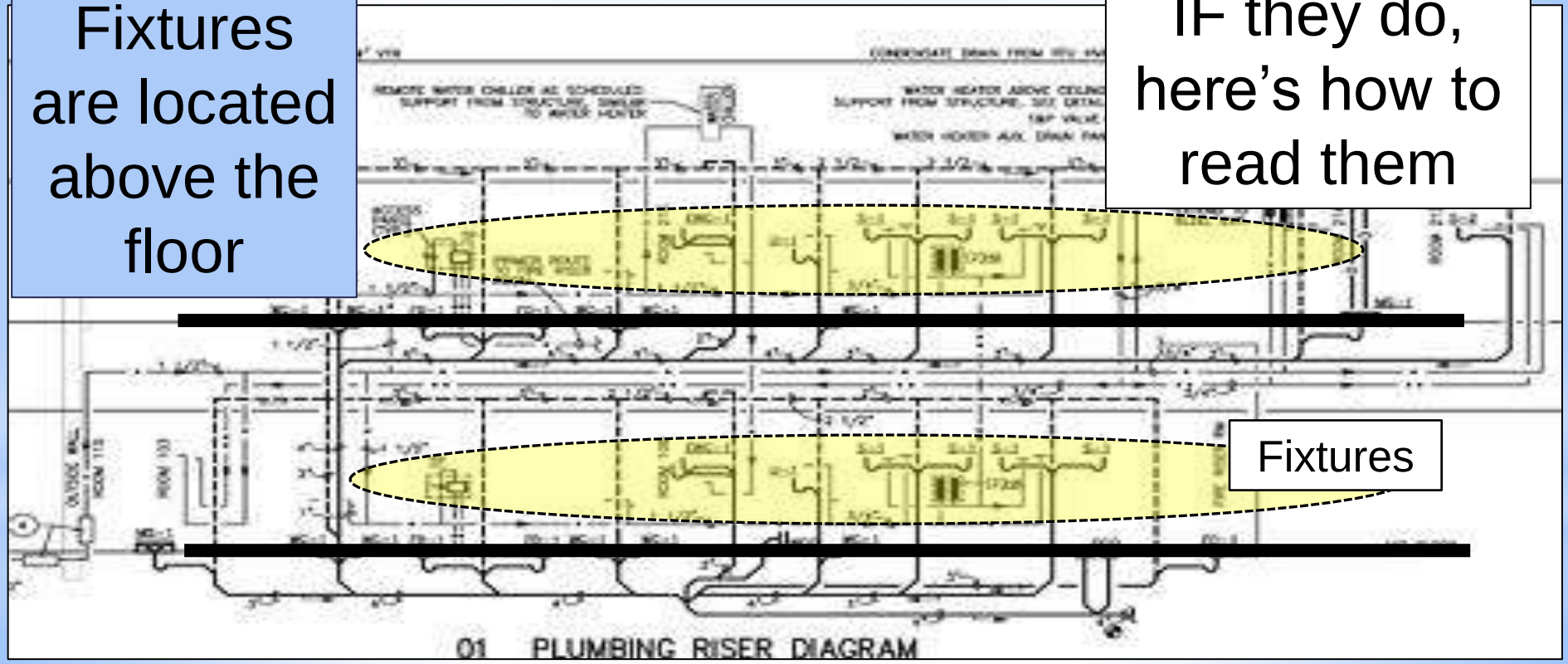
IF they do, here’s how to read them

Plumbing 1-Line Diagrams

Waste Riser

Fixtures are located above the floor

IF they do, here's how to read them

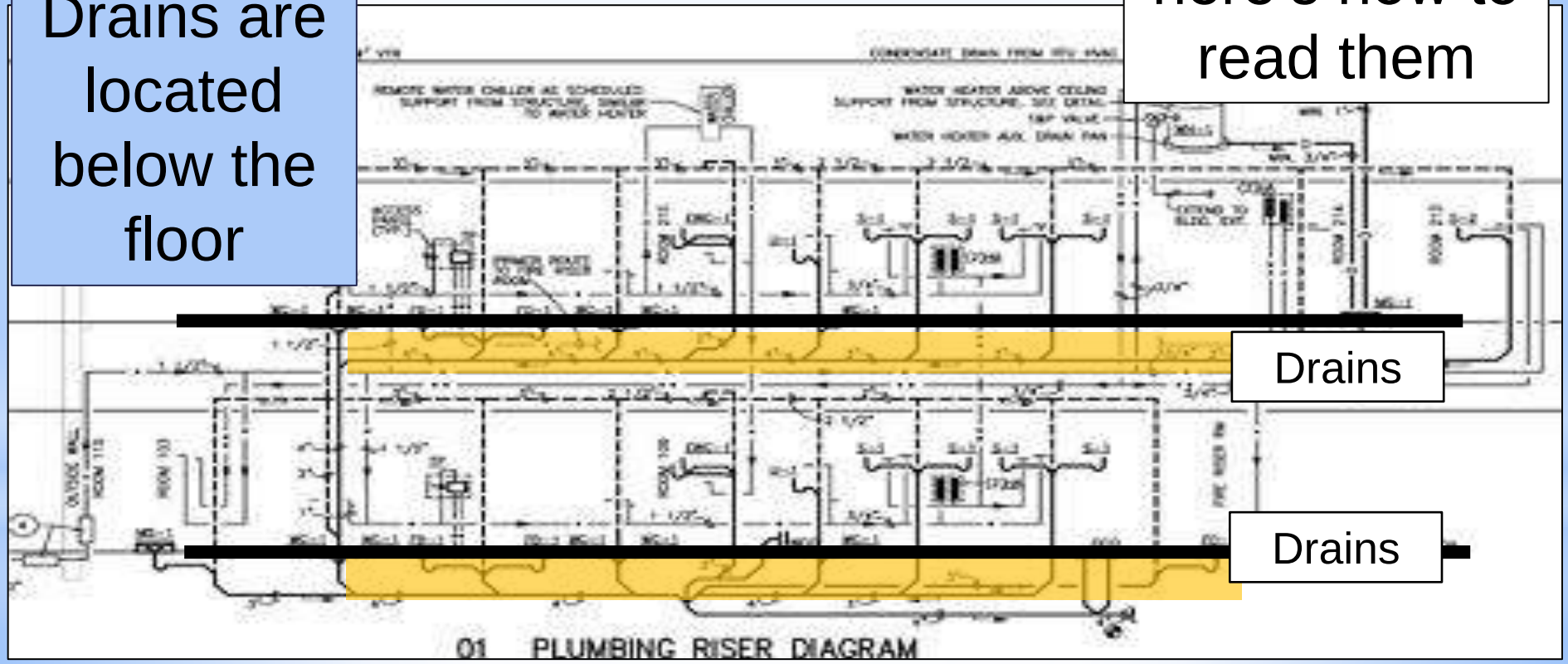


Plumbing 1-Line Diagrams

Waste Riser

IF they do, here's how to read them

Drains are located below the floor

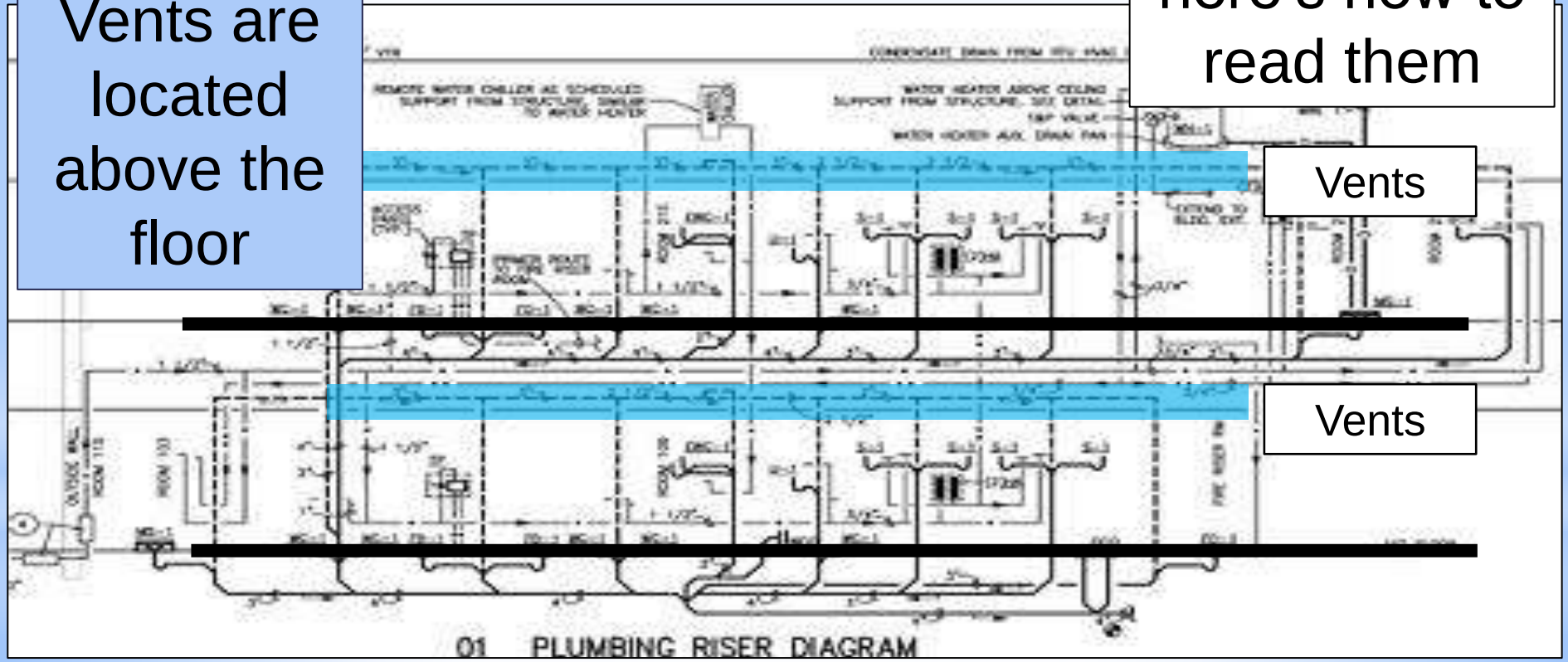


Plumbing 1-Line Diagrams

Waste Riser

IF they do, here's how to read them

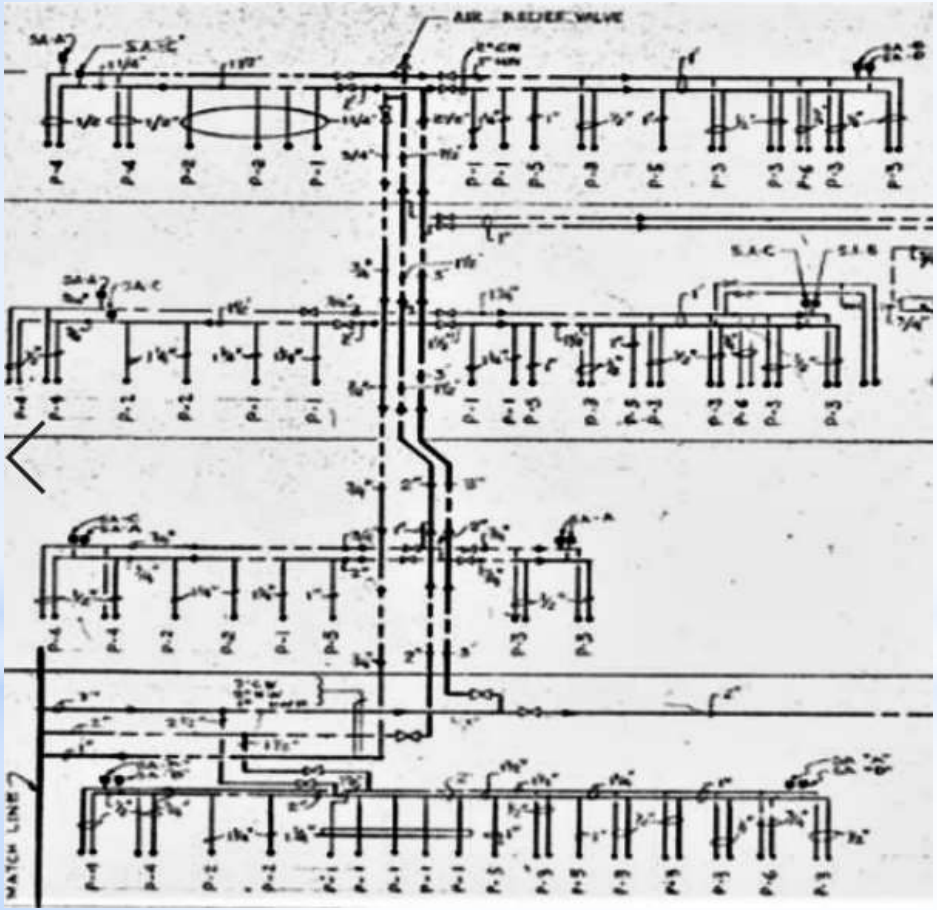
Vents are located above the floor



Plumbing 1-Line Diagrams

Water Riser

Hot Water
Hot Water Recirculating
Cold Water
Deionized Water

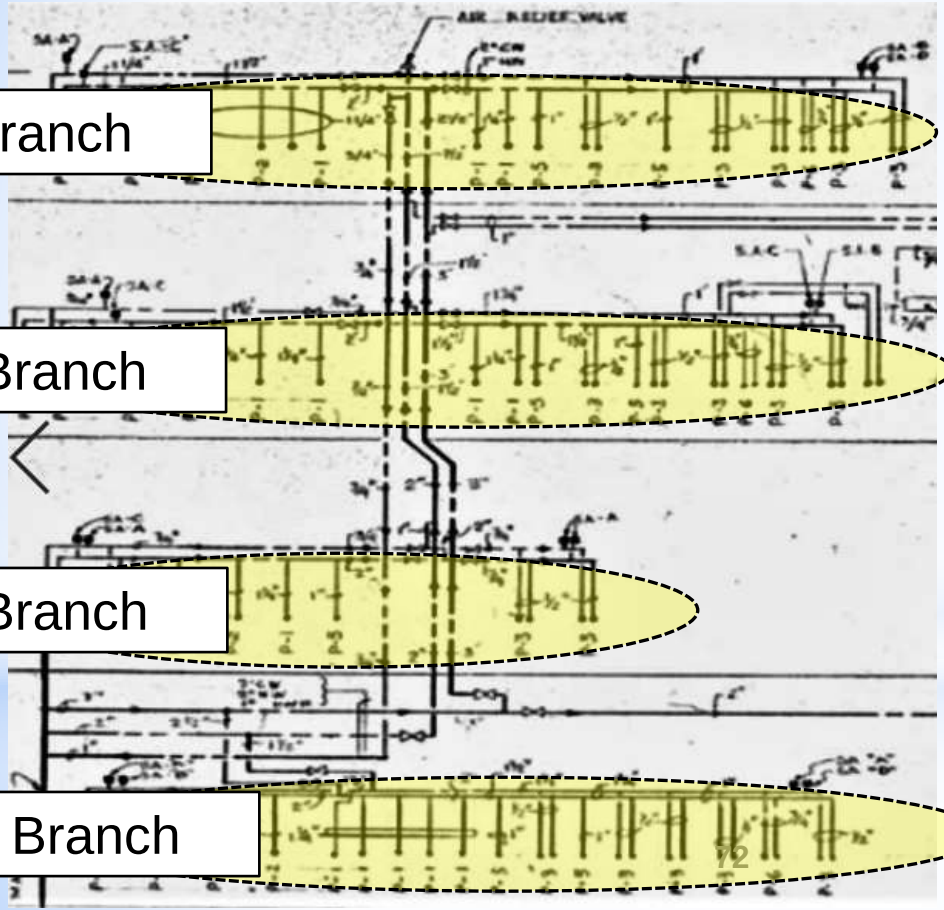


Even more rare, is the water riser diagram

Plumbing 1-Line Diagrams

Water Riser

Hot Water
Hot Water Recirculating
Cold Water
Deionized Water



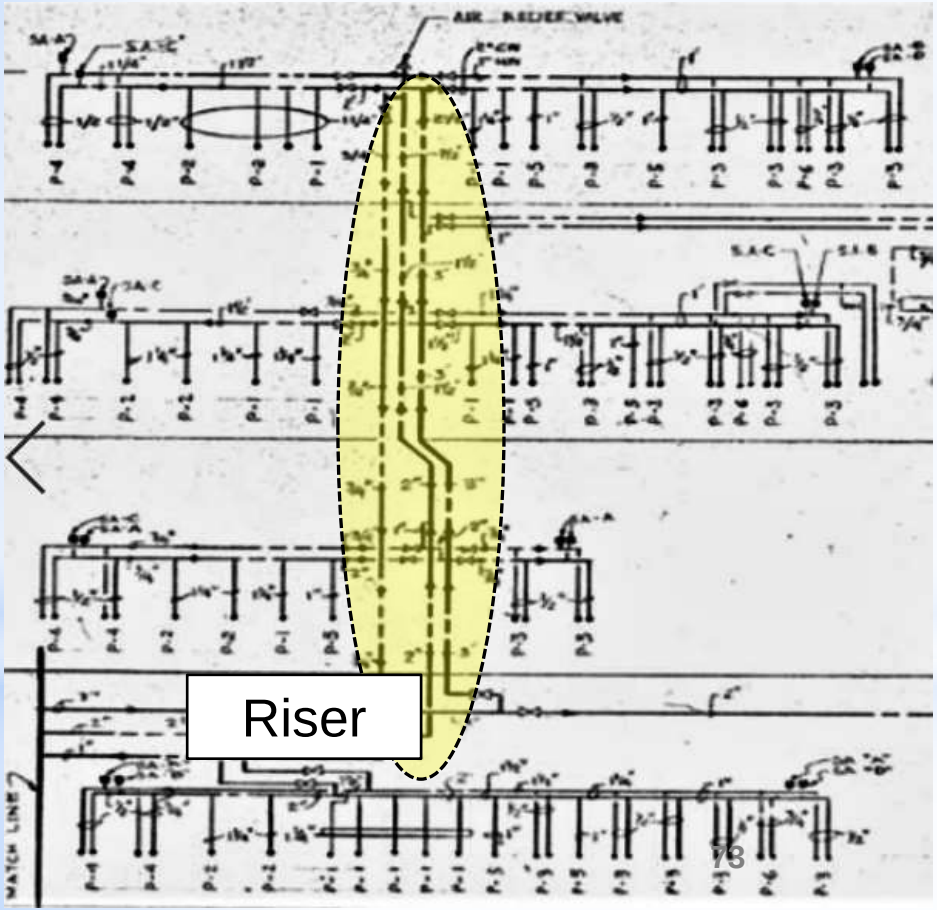
IF they do, here's how to read them

Note, in this layout, water is fed downward from pipes in ceiling

Plumbing 1-Line Diagrams

Water Riser

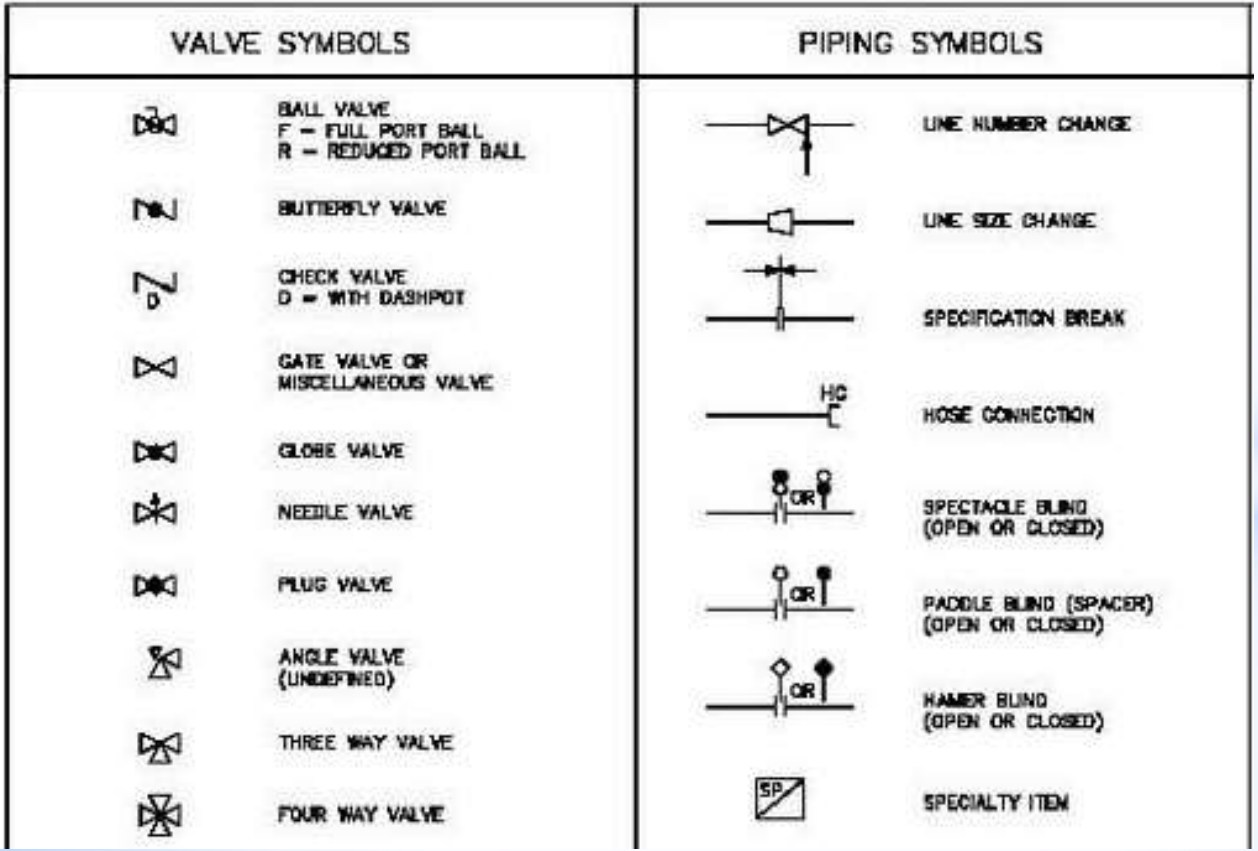
Hot Water
Hot Water Recirculating
Cold Water
Deionized Water



IF they do, here's how to read them

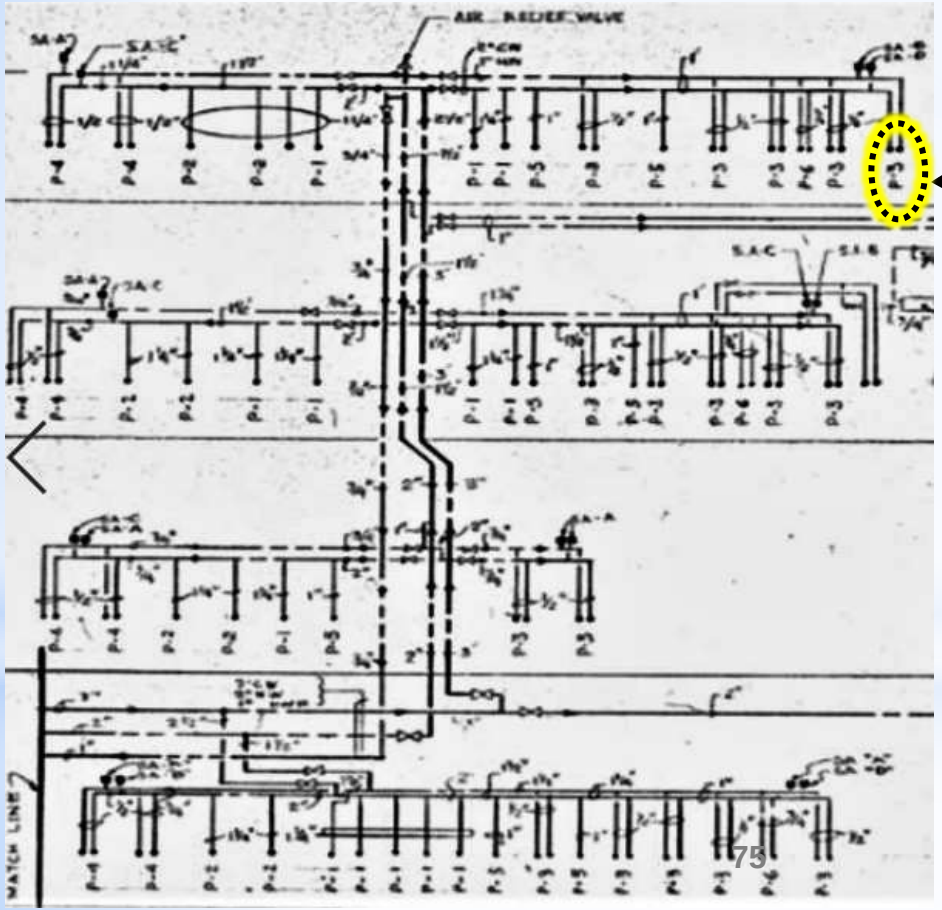
Plumbing 1-Line Diagrams

Symbols



Plumbing 1-Line Diagrams

Water Riser



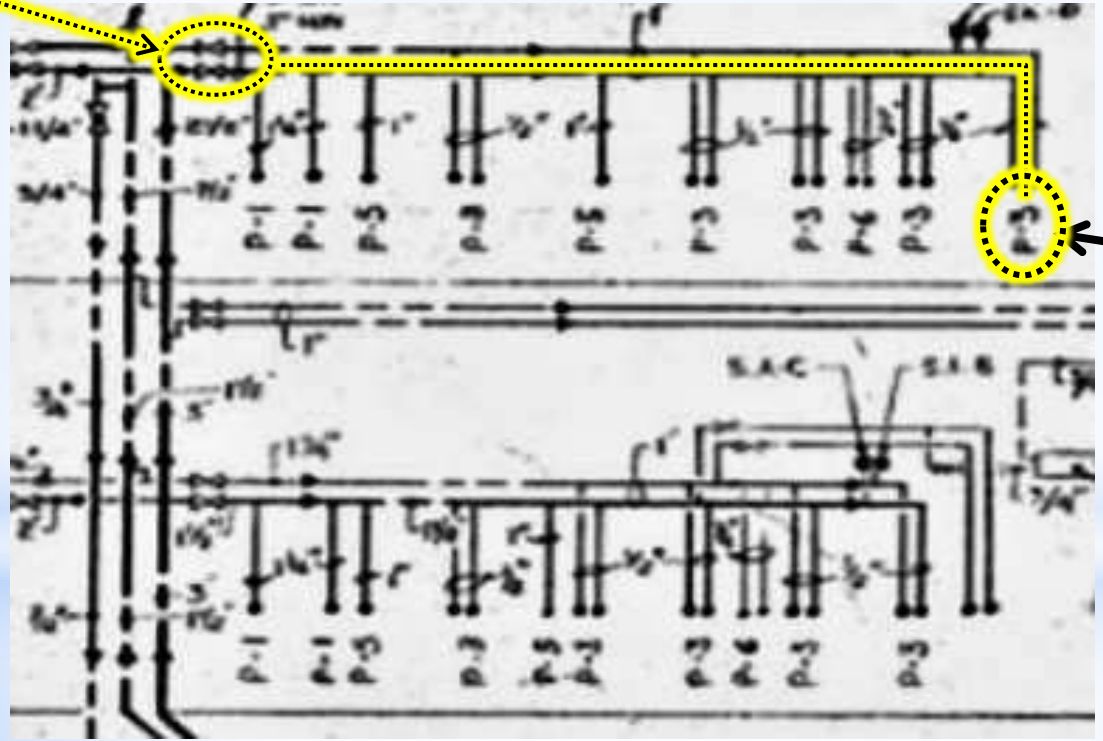
Exercise #1: Find shutoff valve for sink on the 3rd floor?

75

Plumbing 1-Line Diagrams

Water Riser

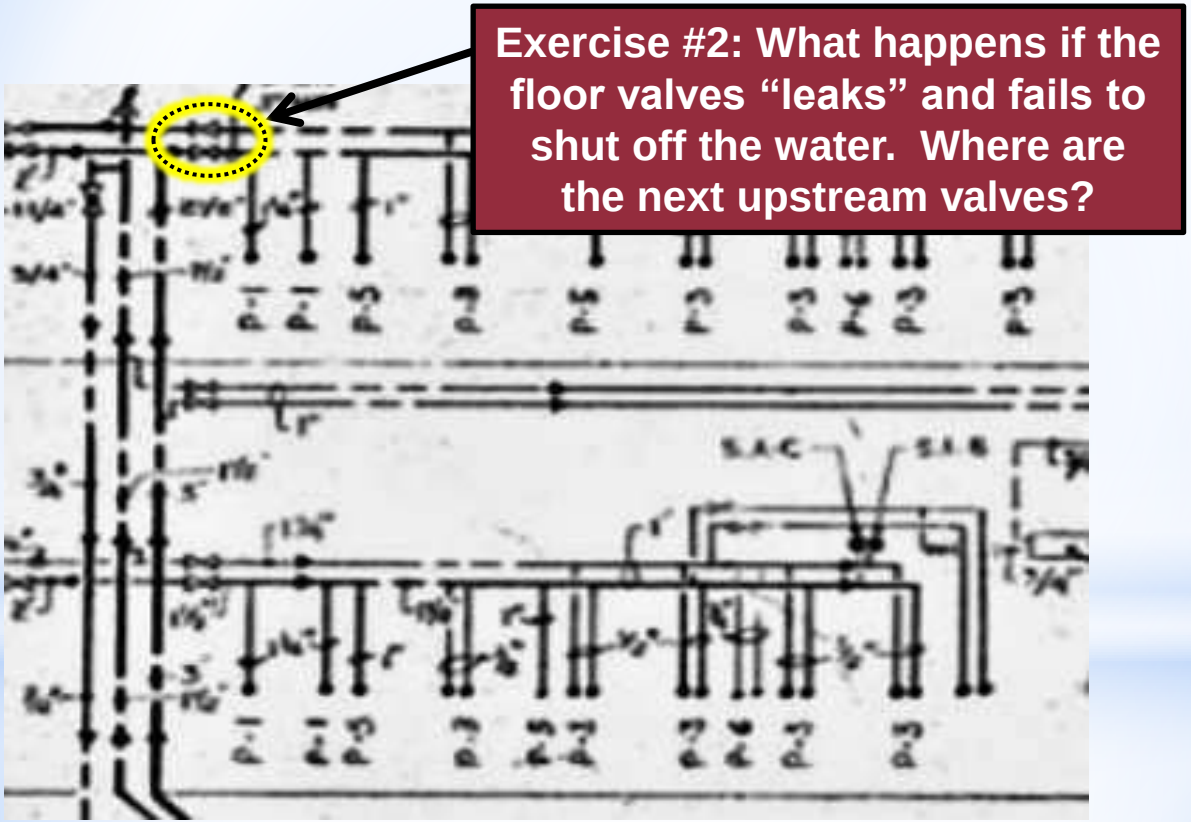
Valves are in ceiling (probably in hall outside of room with a P-1 sink)



Exercise #1: Find shutoff valve for sink on the 3rd floor?

Plumbing 1-Line Diagrams

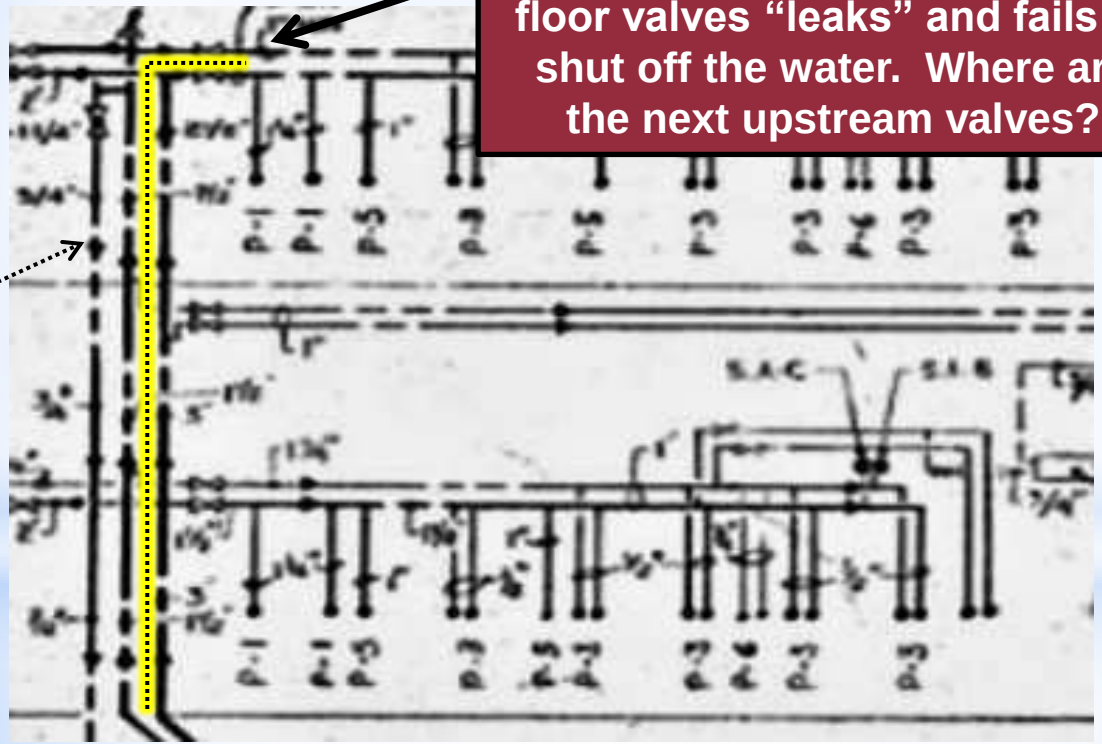
Water Riser



Plumbing 1-Line Diagrams

Water Riser

Must trace the water piping upsteam until you find a valve, in this case, down the riser

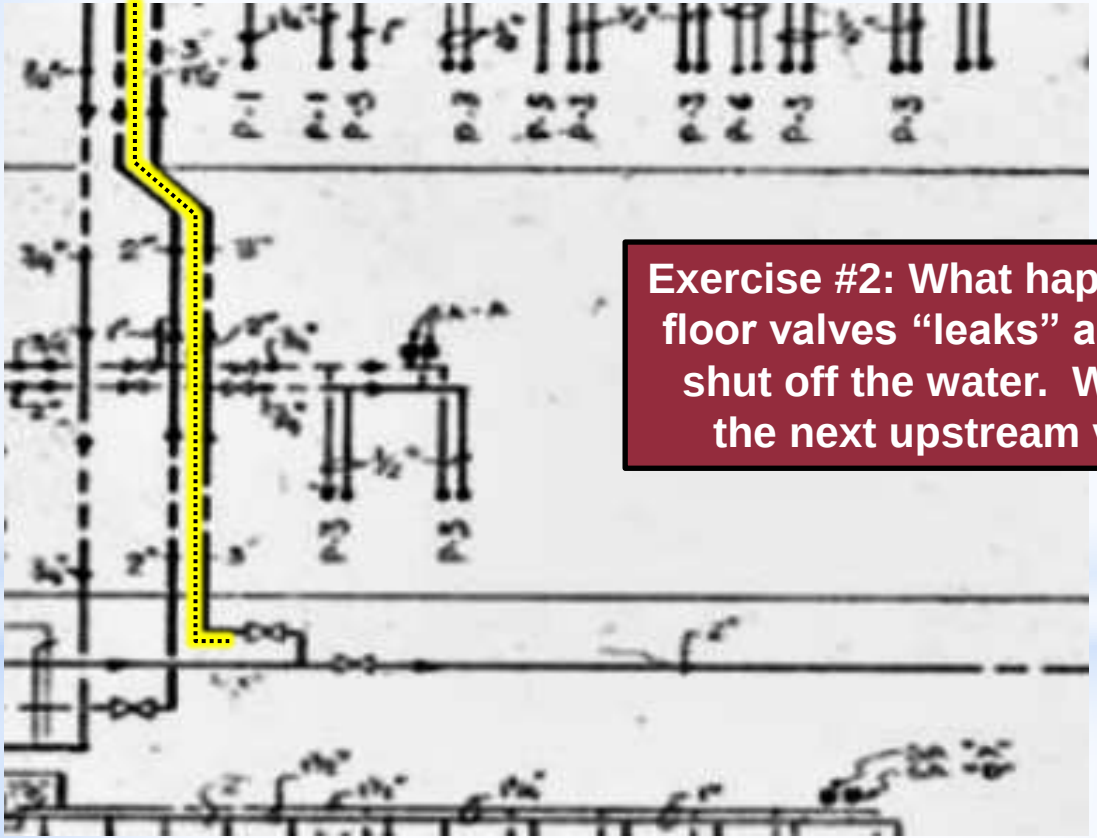


Exercise #2: What happens if the floor valves "leaks" and fails to shut off the water. Where are the next upstream valves?

Plumbing 1-Line Diagrams

Water Riser

Must trace the water piping upsteam until you find a valve, in this case, down the riser

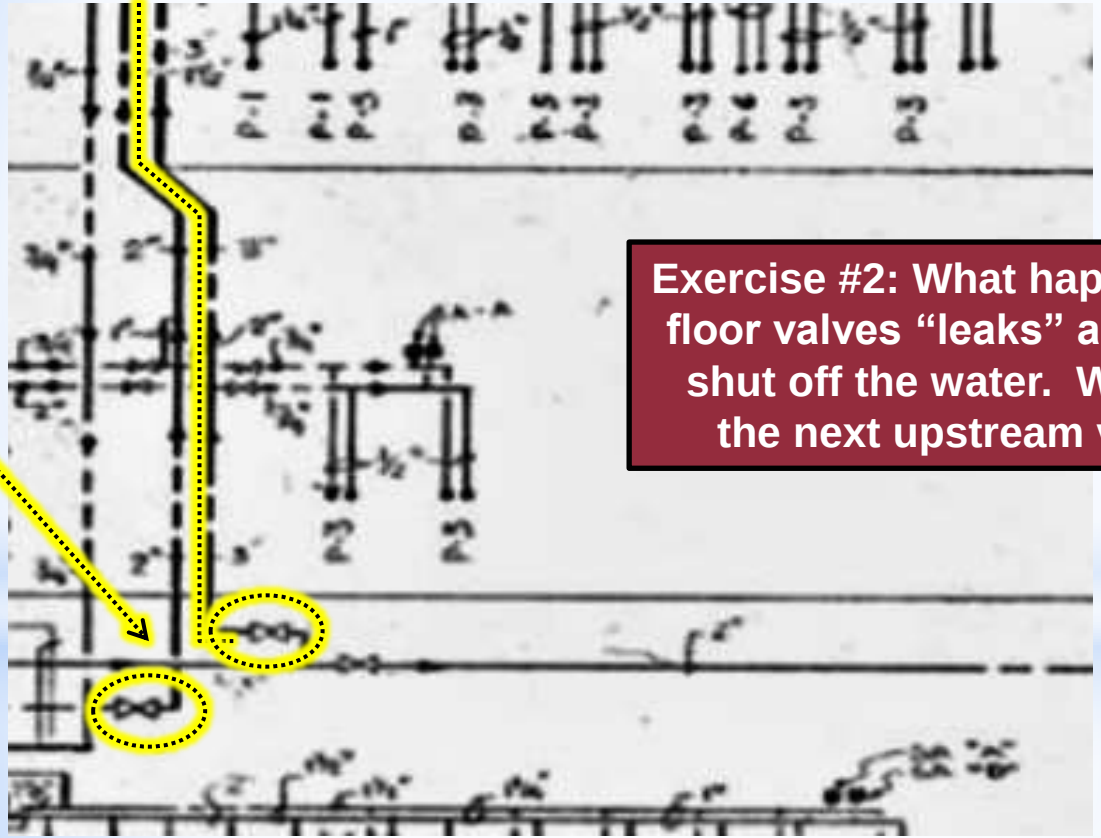


Exercise #2: What happens if the floor valves "leaks" and fails to shut off the water. Where are the next upstream valves?

Plumbing 1-Line Diagrams

Water Riser

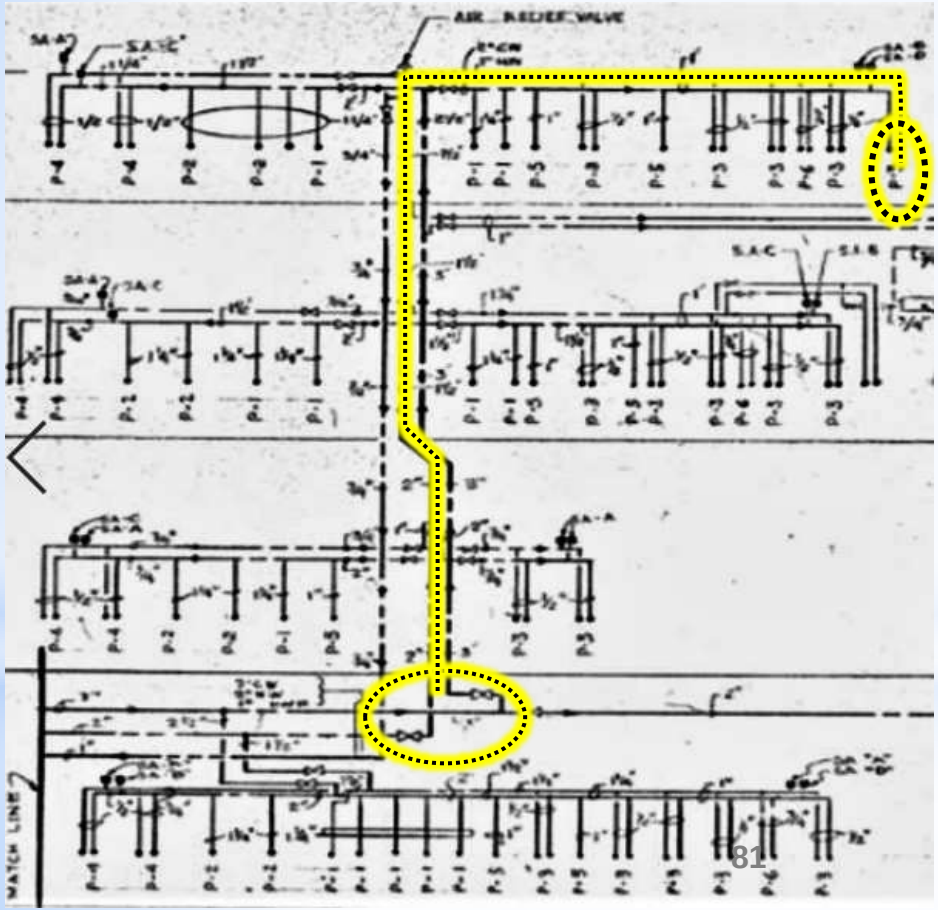
Valves are in ceiling on the ground floor



Exercise #2: What happens if the floor valves "leaks" and fails to shut off the water. Where are the next upstream valves?

Plumbing 1-Line Diagrams

Water Riser



Exercise #2

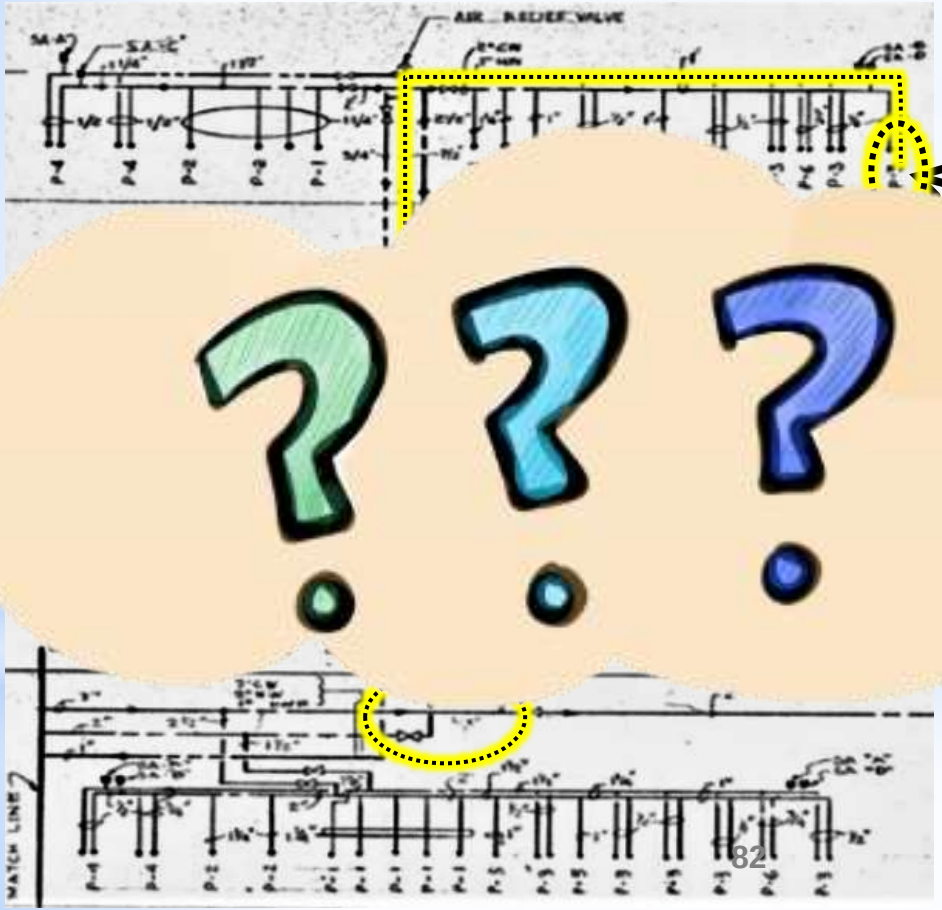
Must go to floor plan to get precise location of the ground level valves

HINT: best to put room # next to each fixture

81

Plumbing 1-Line Diagrams

Water Riser



Exercise #2: Where are the next ...stream valves?

...oor plan to ... location of ... level valves

HINT: best to put room # next to each fixture

82

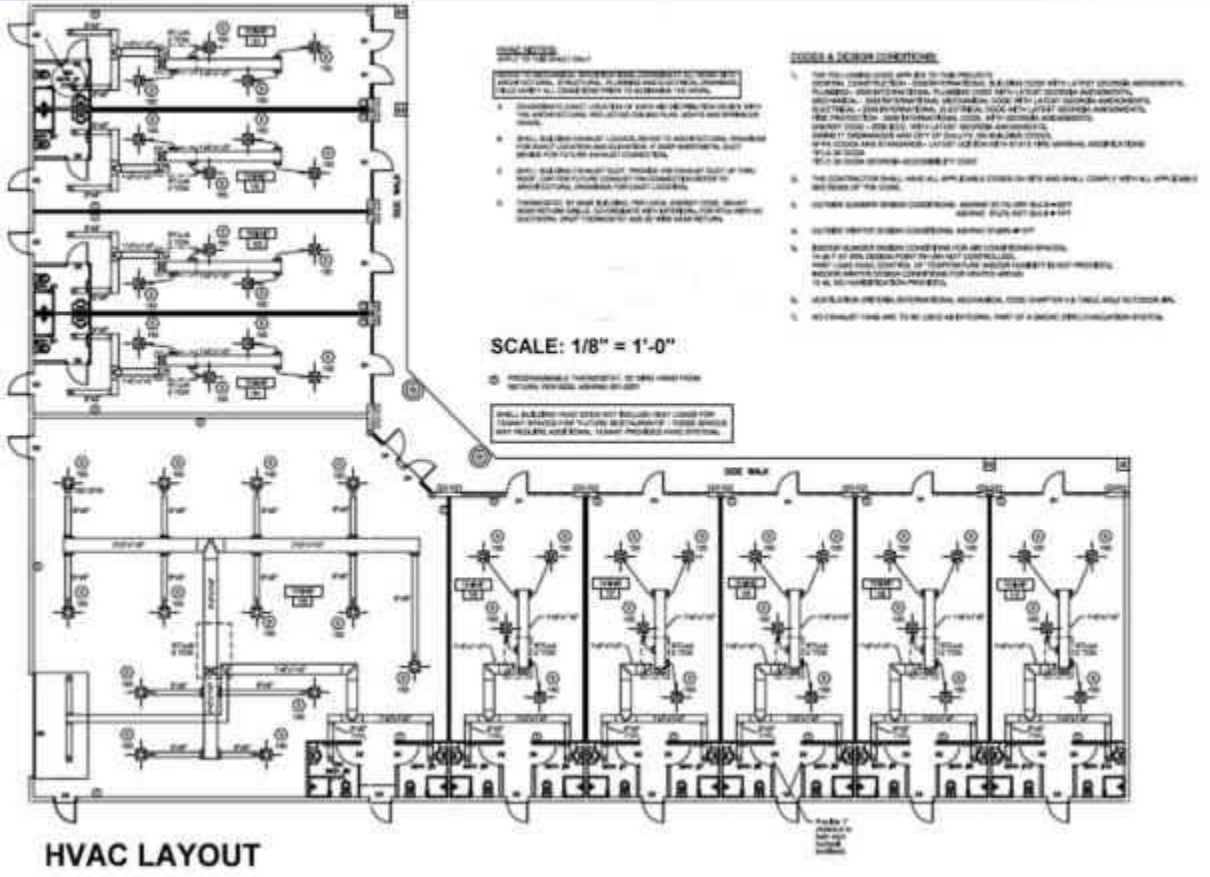
Bill Lauzon

One-Line Diagrams

1. Electrical 1-Lines
2. Plumbing 1-Lines
3. HVAC 1-Lines
4. Med Gas 1-Lines
5. Sprinkler 1-Lines

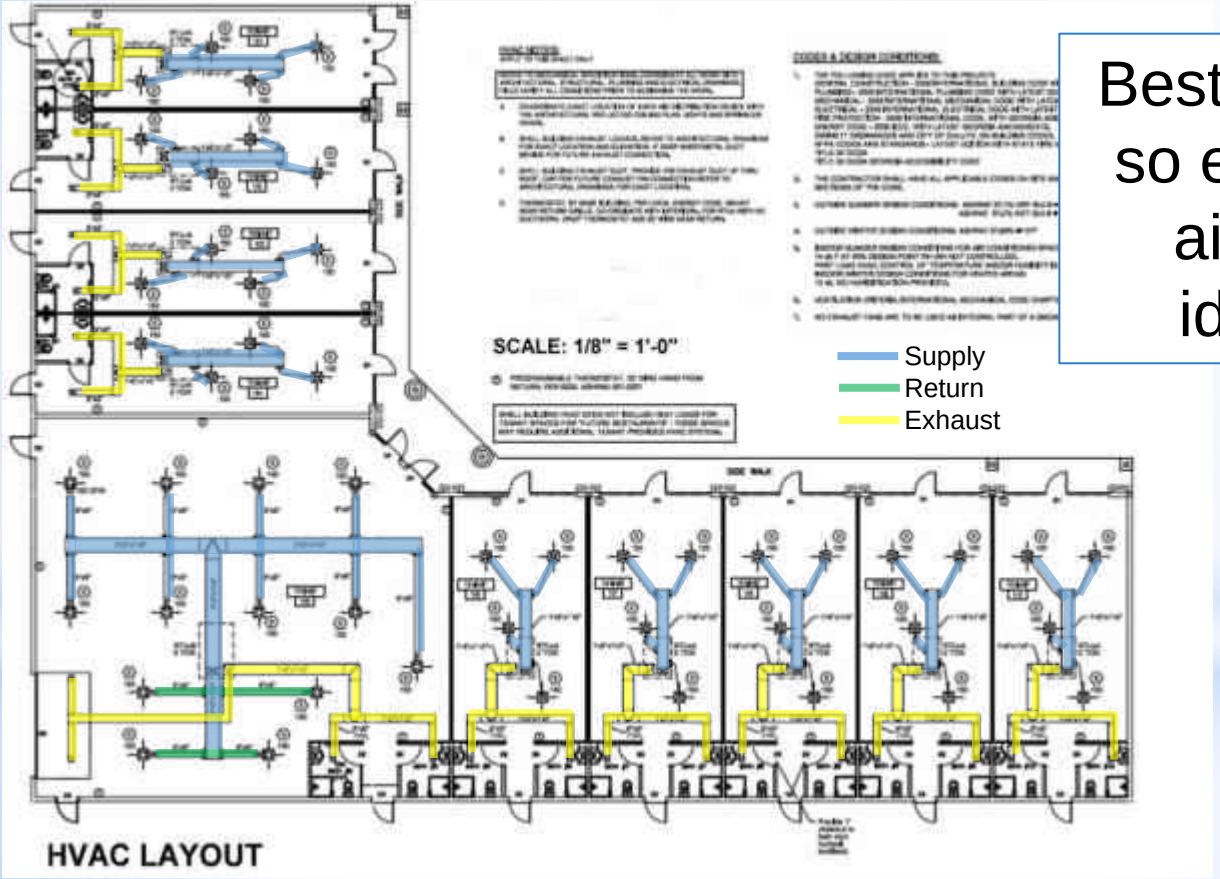
HVAC 1-Line Diagrams

HVAC Floor Plan



HVAC 1-Line Diagrams

HVAC Floor Plan

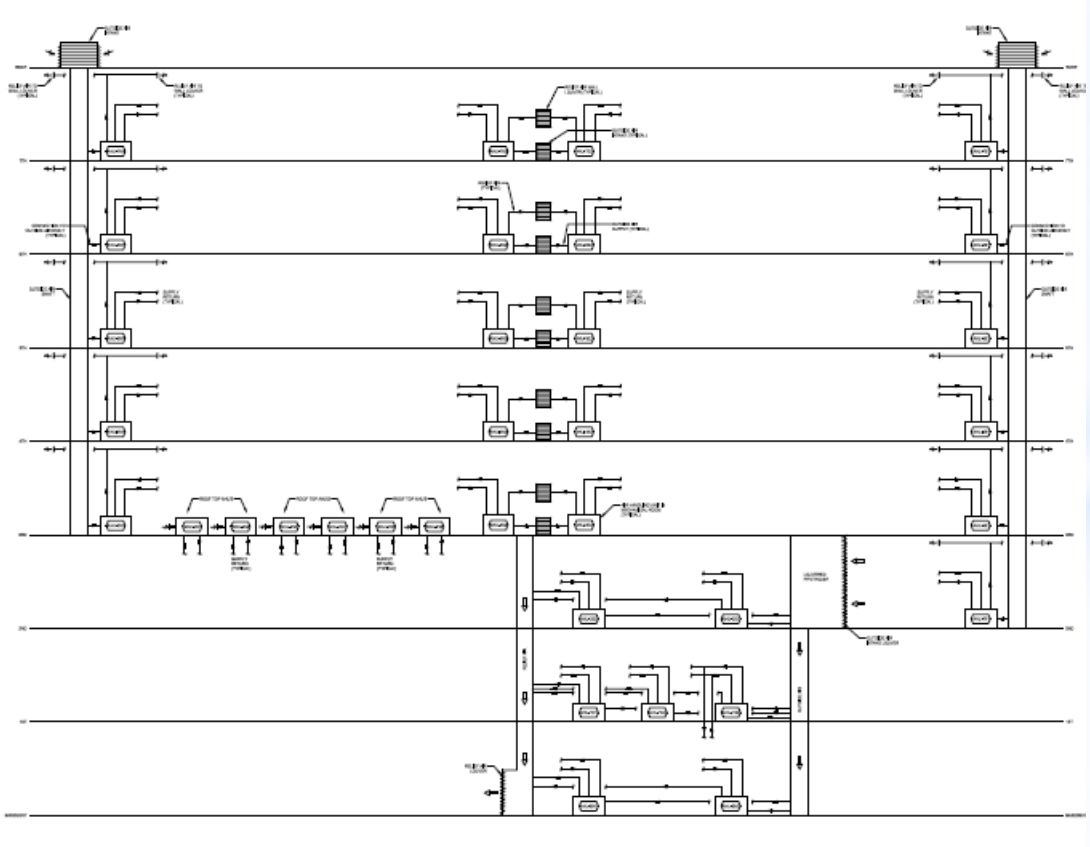


Best to Colorize, so each type of air is easily identifiable

No standard colors

HVAC 1-Line Diagrams

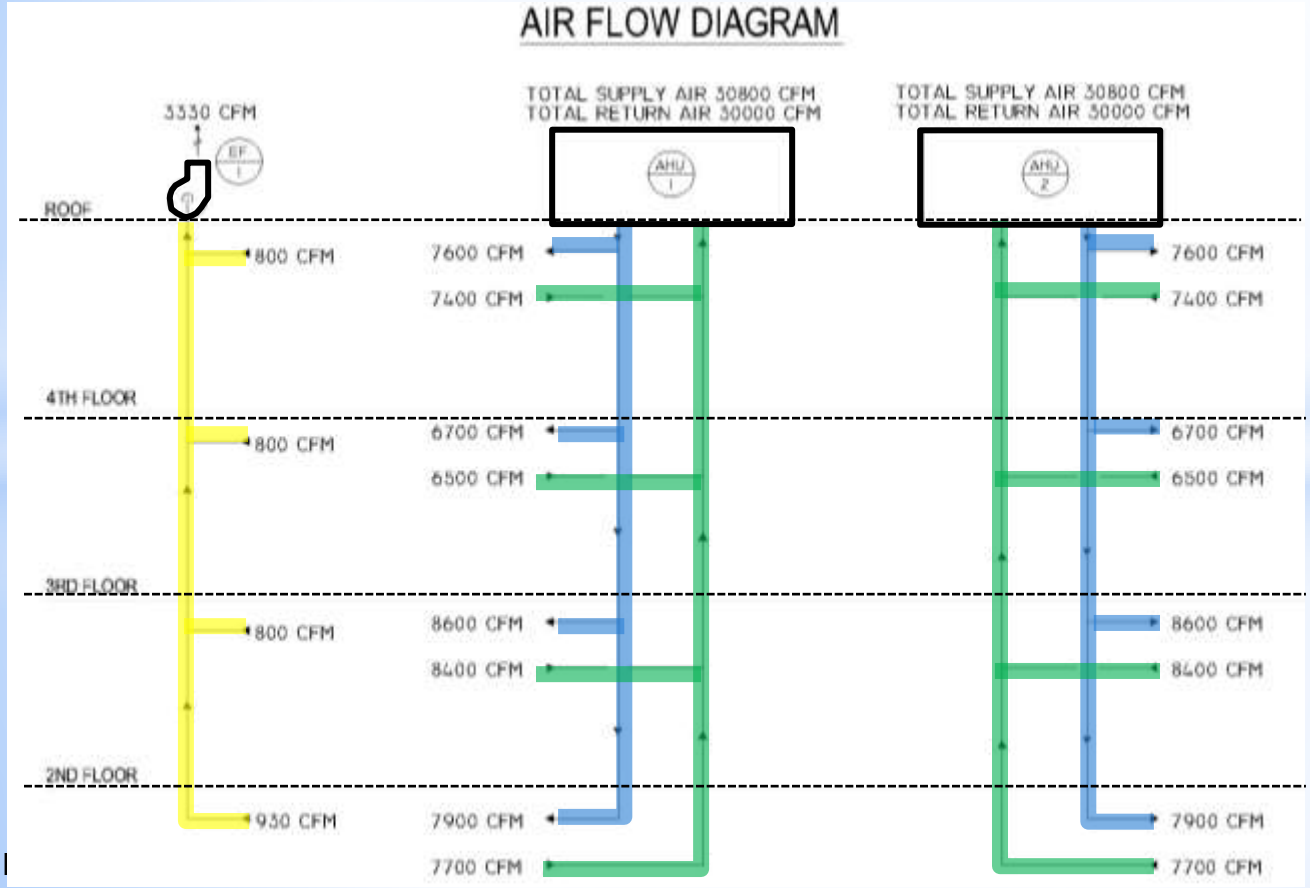
HVAC Riser Diagram



HVAC Riser Diagrams are RARE

HVAC 1-Line Diagrams

HVAC Air Flow Diagram

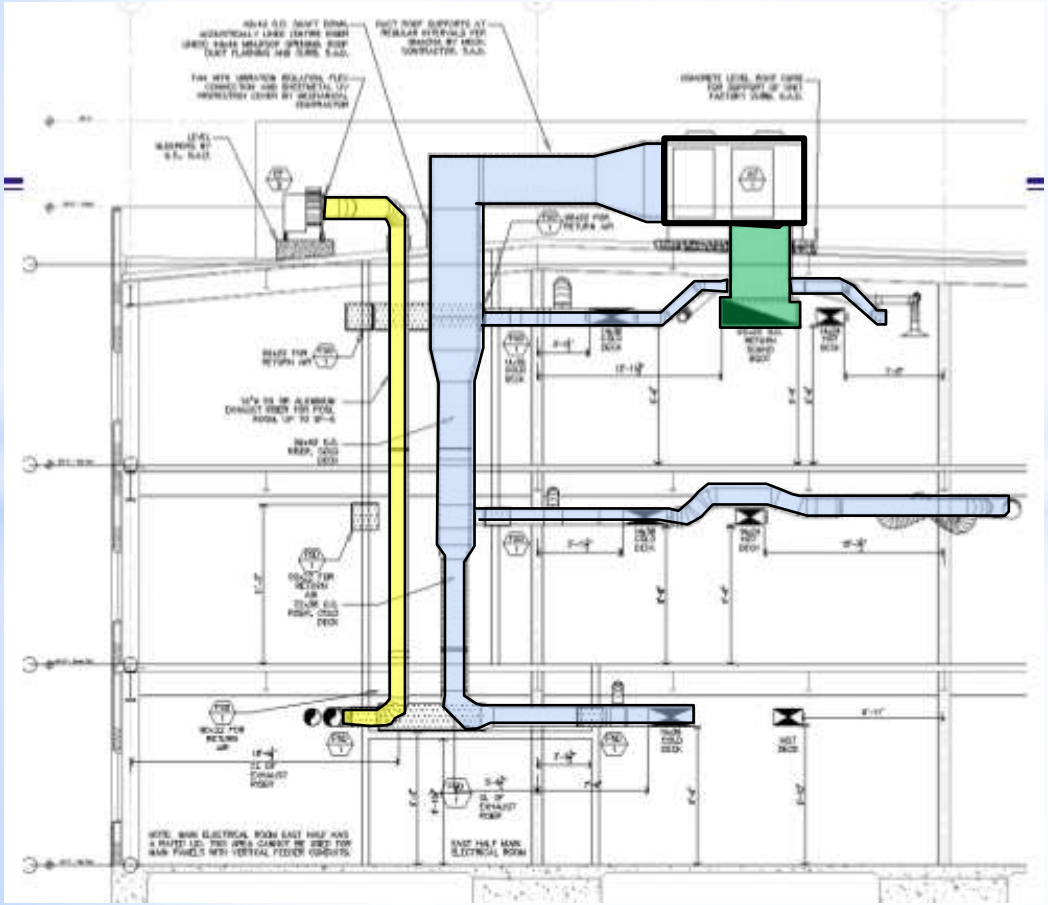


Supply
Return
Exhaust

Infrequently, HVAC plans have an air flow diagram

HVAC 1-Line Diagrams

HVAC Duct Elevation Diagram

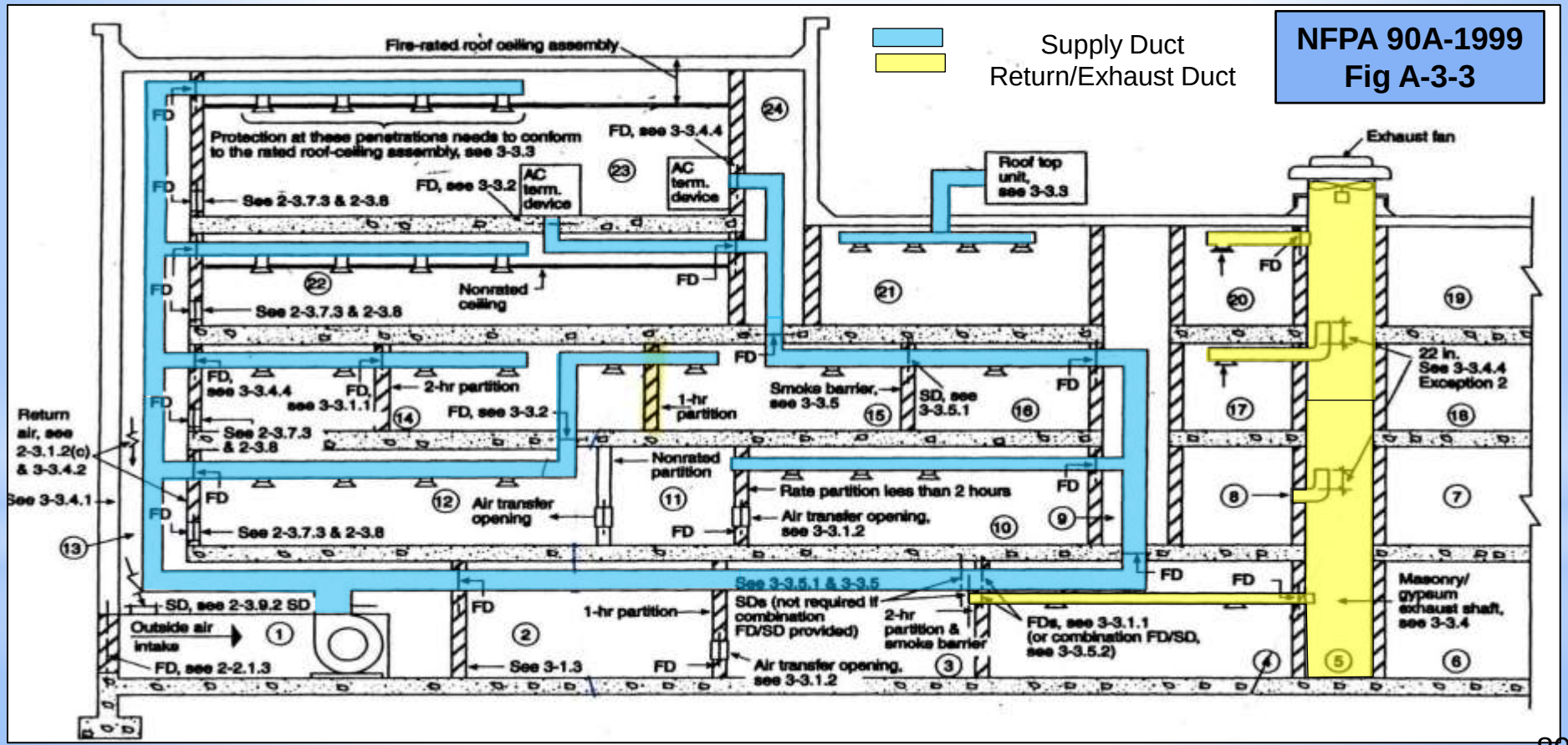


Supply
Return
Exhaust

Sometimes, HVAC plans have duct elevation details

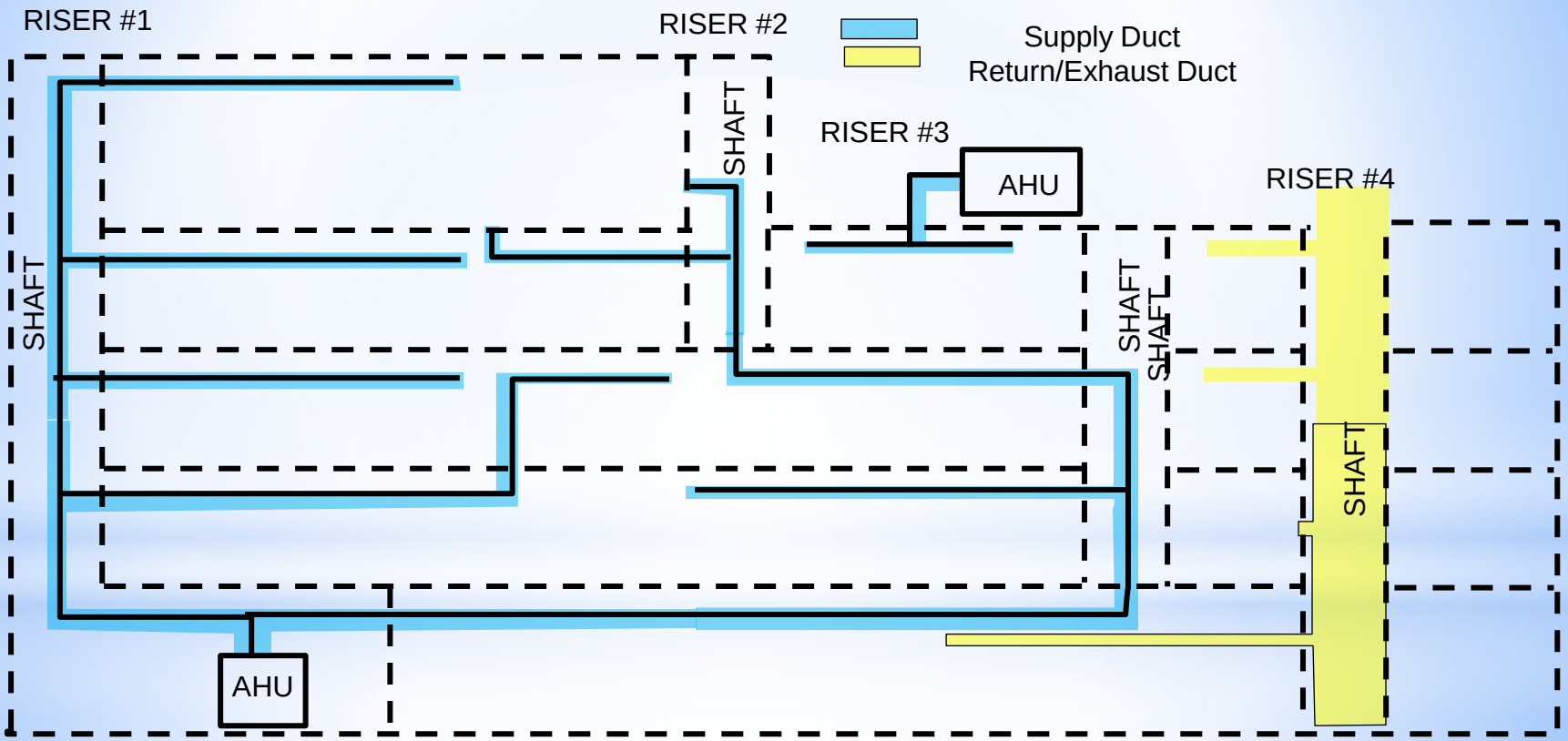
HVAC 1-Line Diagrams

NFPA Diagram



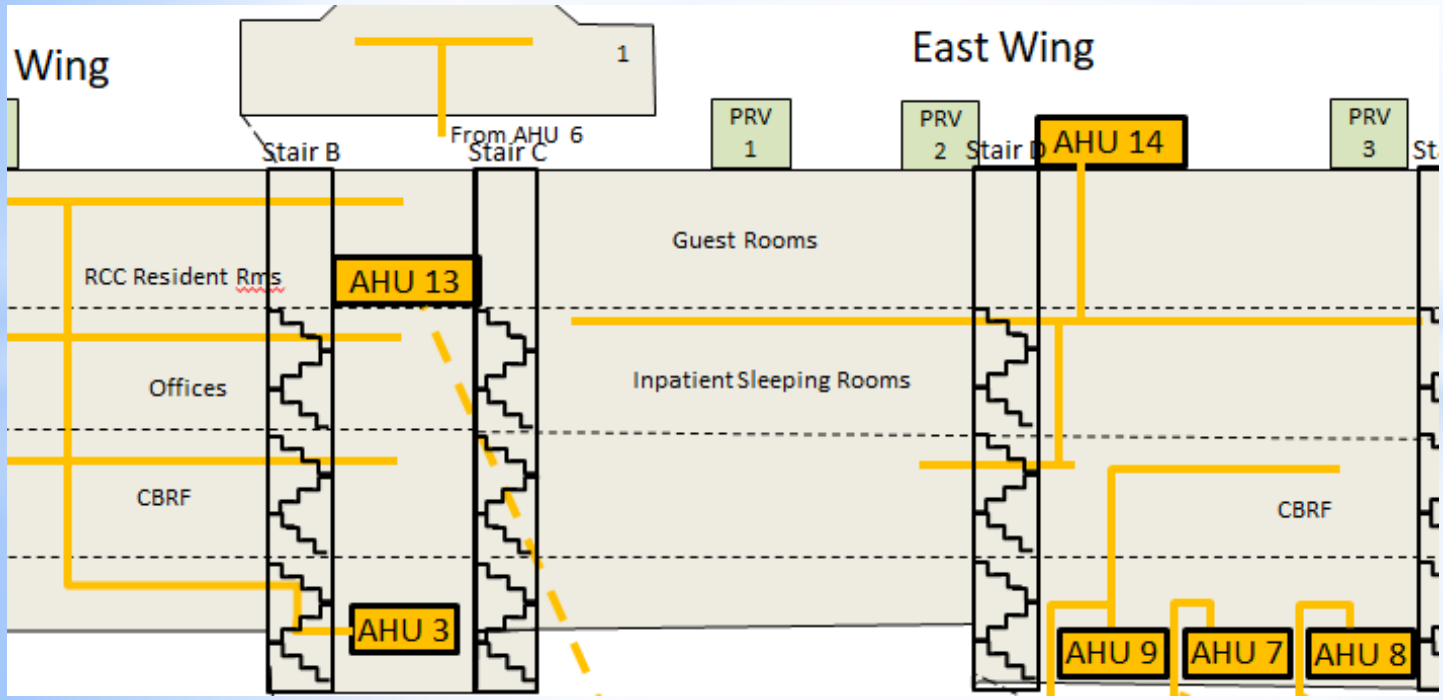
HVAC 1-Line Diagrams

NFPA Diagram-Drawn as a 1-Line



HVAC 1-Line Diagrams

HVAC Riser Diagram

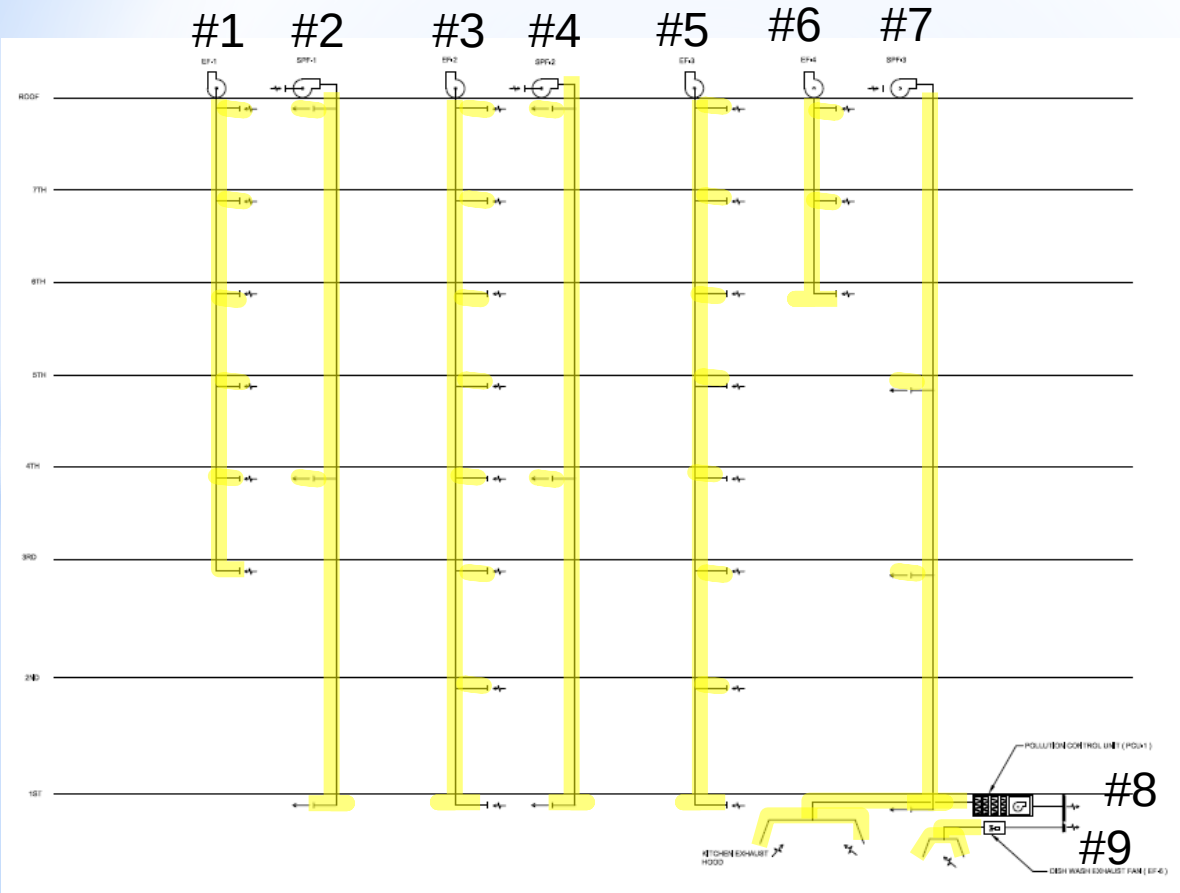


Riser can show area of service of AHU

Used if AHUs serve multiple floors

HVAC 1-Line Diagrams

Exhaust Riser Diagram



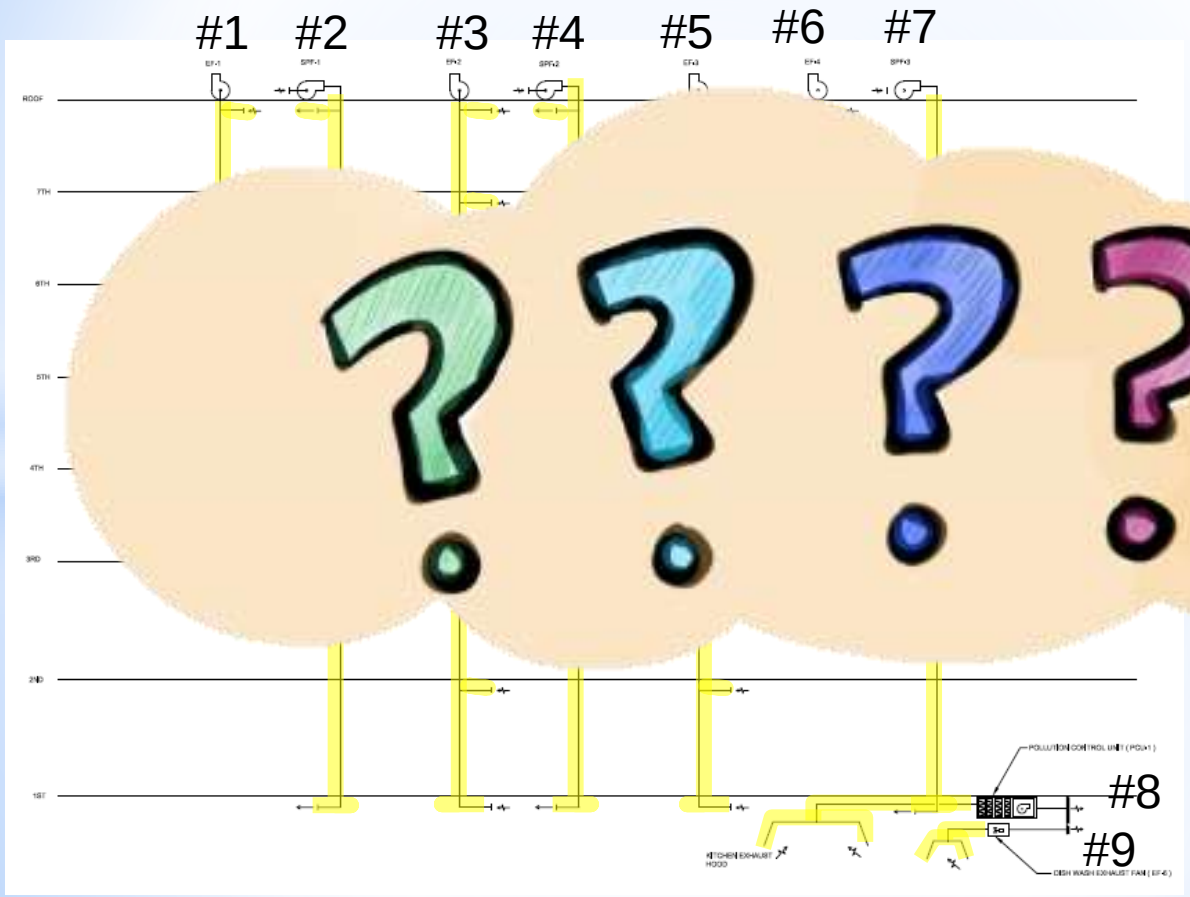
Best to # each supply/return & exhaust duct riser

and show on the plan view

Also best to show room location of each shaft

HVAC 1-Line Diagrams

Exhaust Riser Diagram



Best to # each supply/return & exhaust riser

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Also best to show room location of each shaft

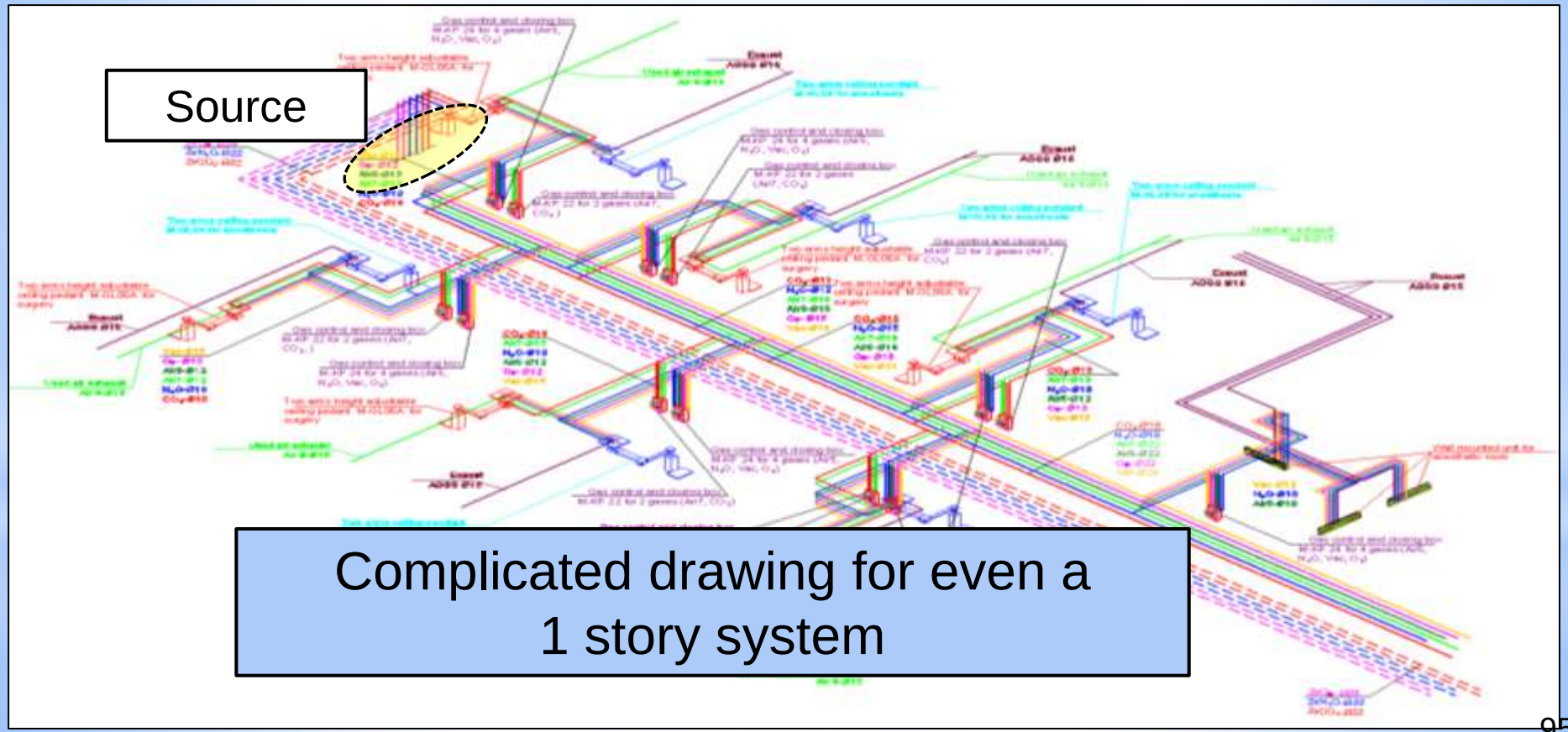
Bill Lauzon

One-Line Diagrams

1. Electrical 1-Lines
2. Plumbing 1-Lines
3. HVAC 1-Lines
4. Med Gas 1-Lines
5. Sprinkler 1-Lines

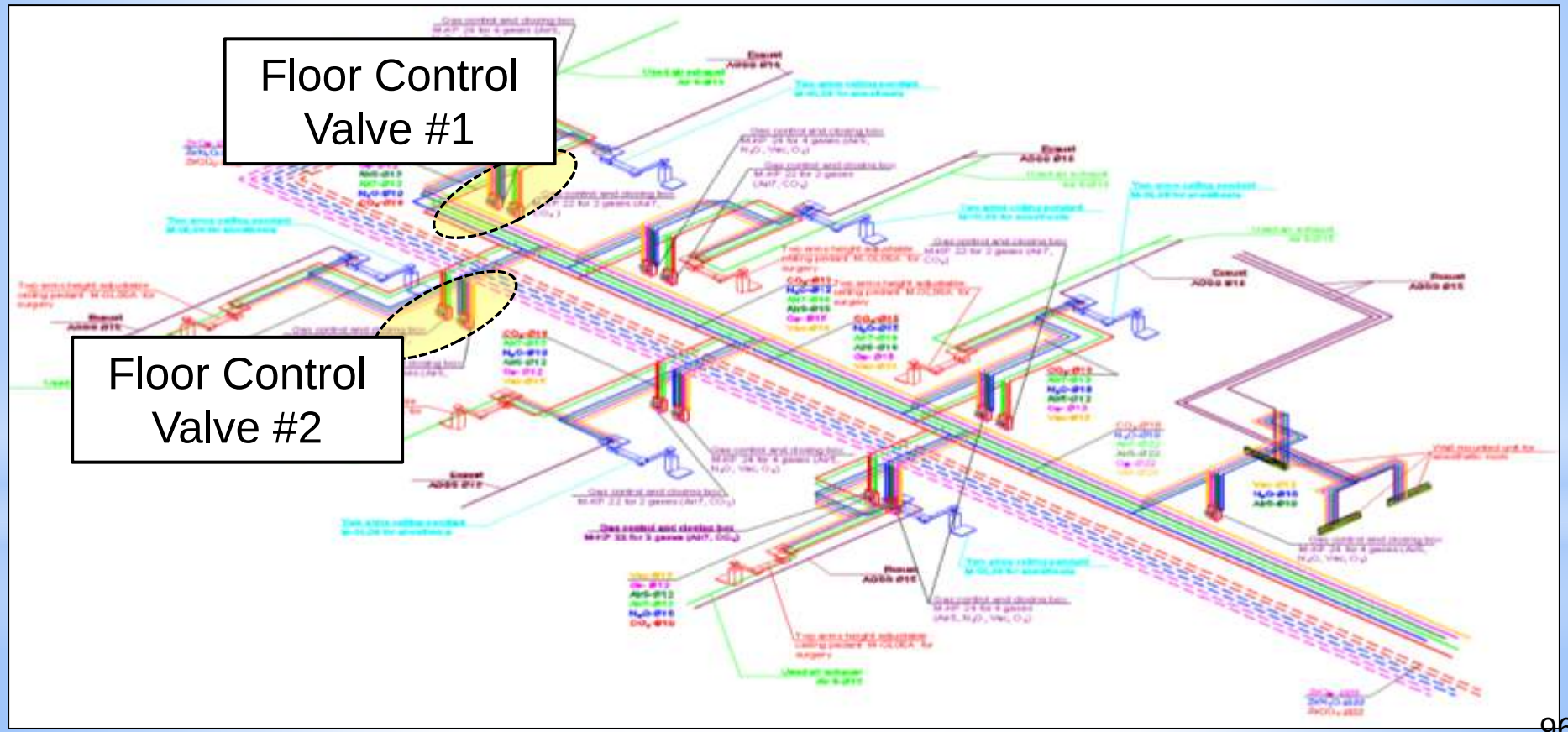
Med Gas 1-Line Diagrams

3D Isometric Diagram



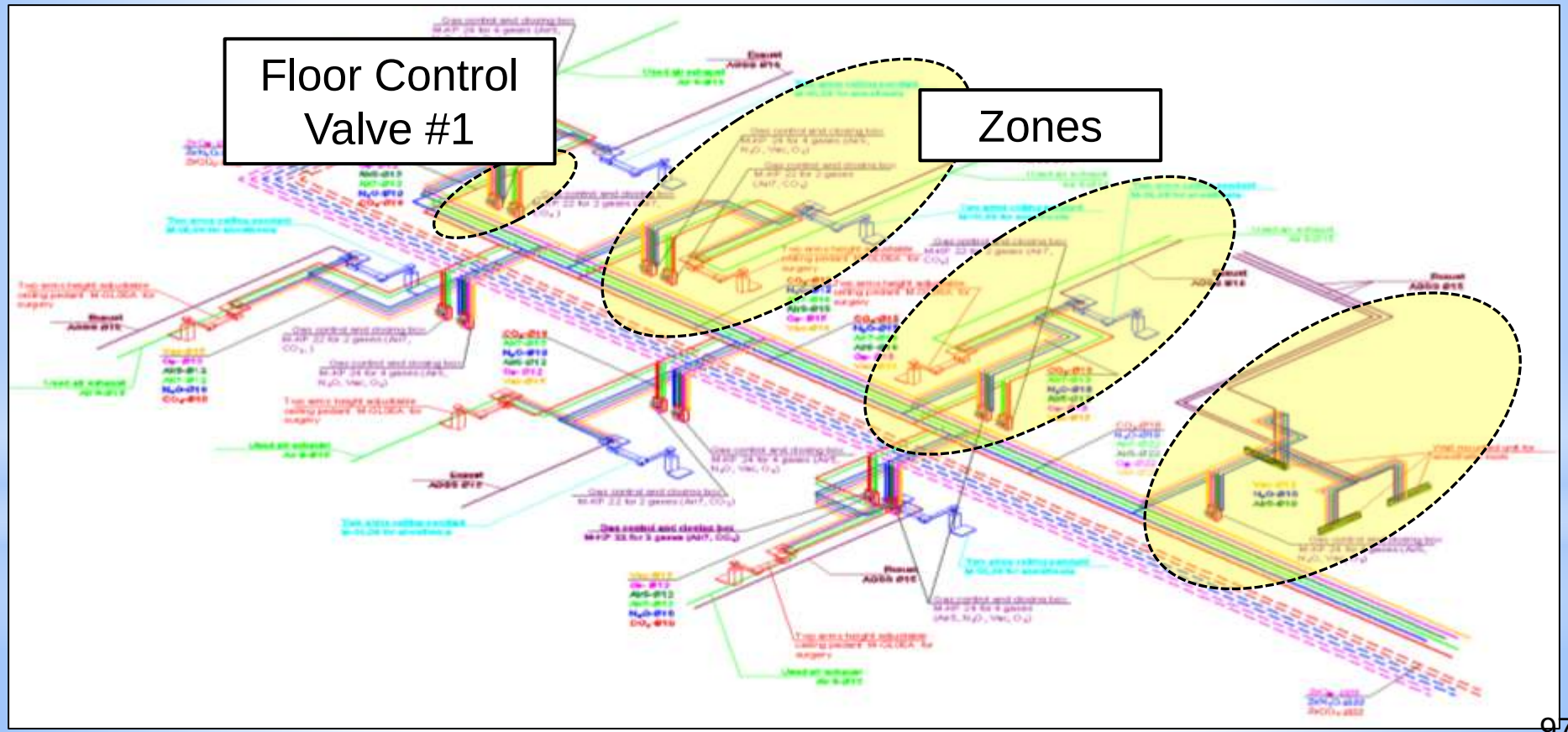
Med Gas 1-Line Diagrams

3D Isometric Diagram



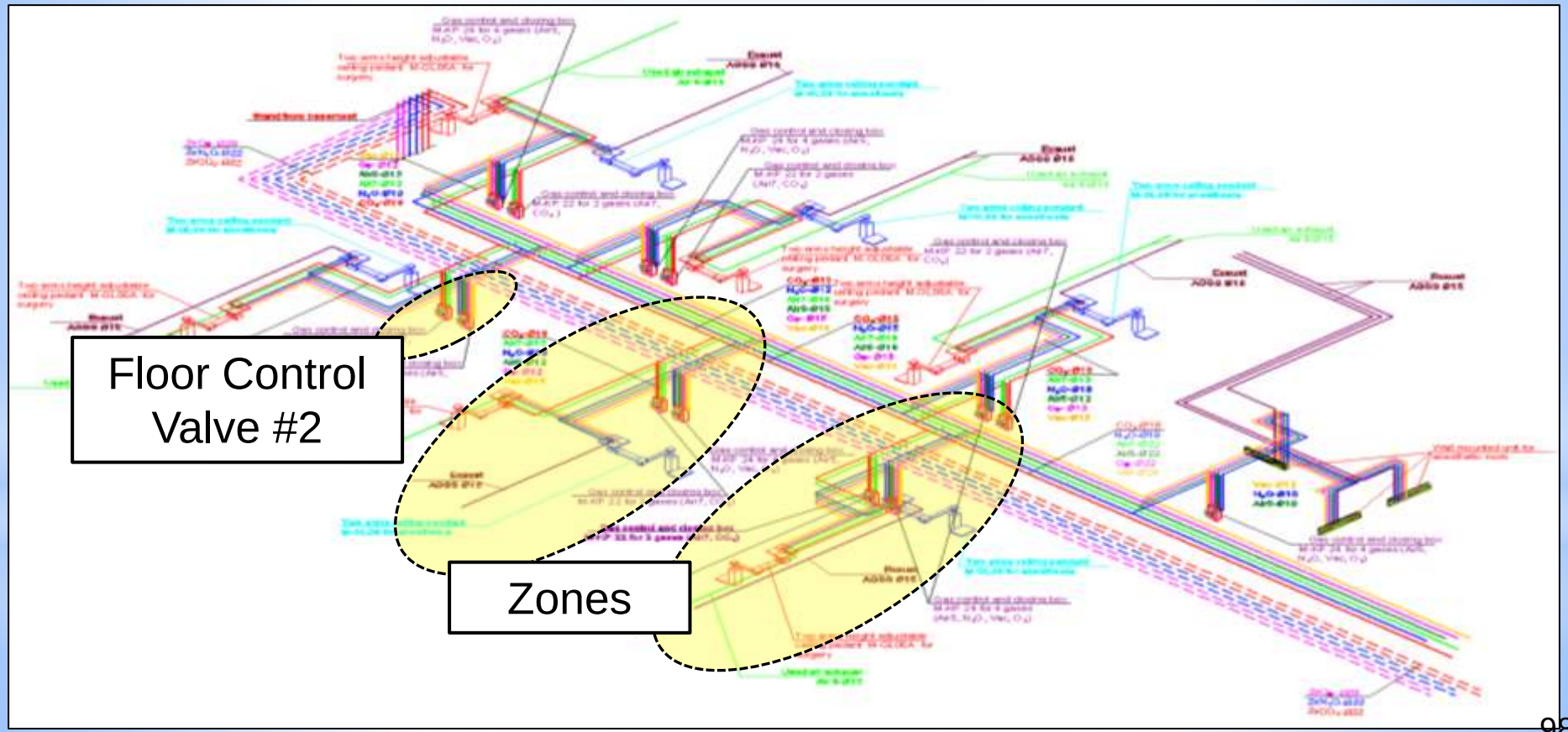
Med Gas 1-Line Diagrams

3D Isometric Diagram



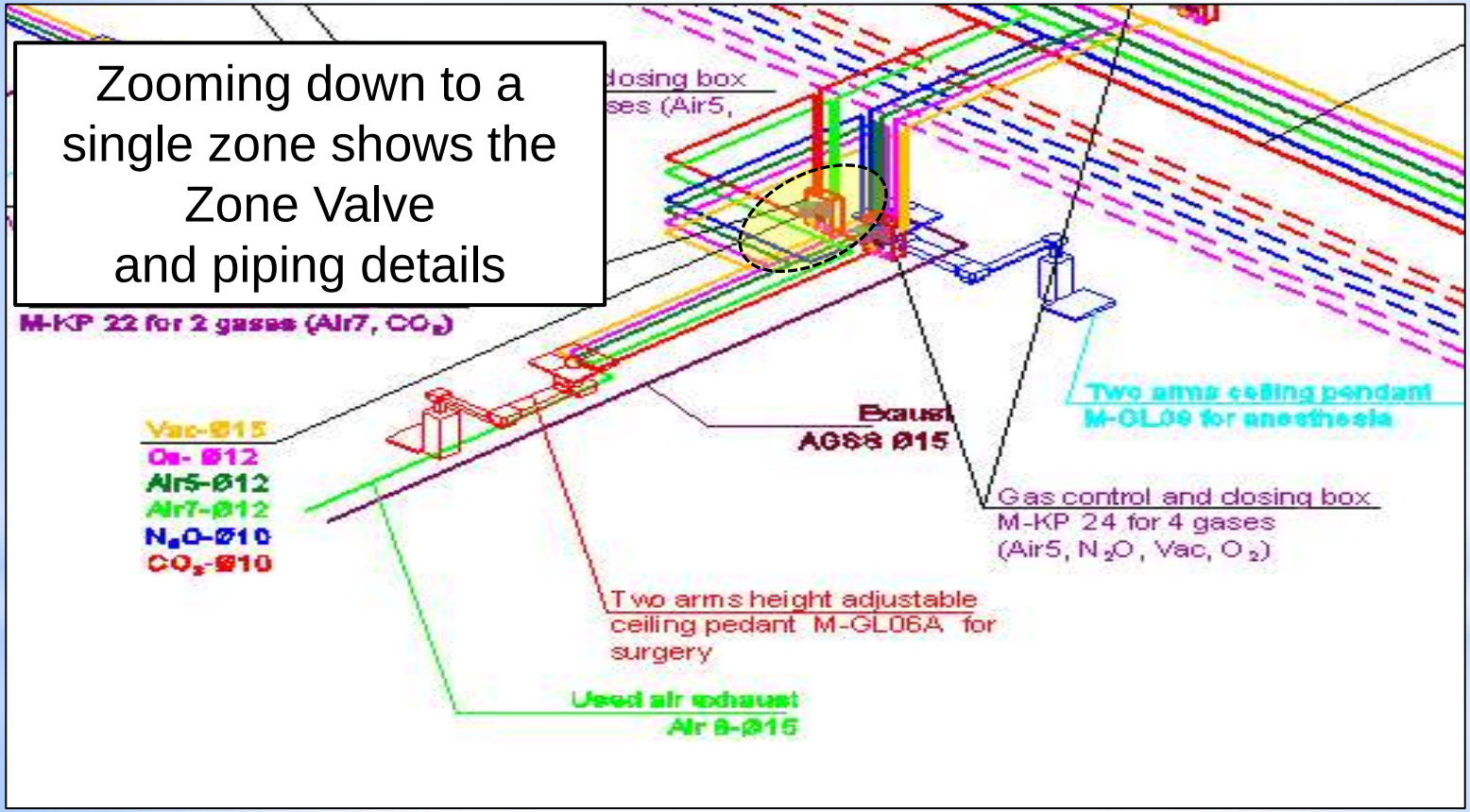
Med Gas 1-Line Diagrams

3D Isometric Diagram



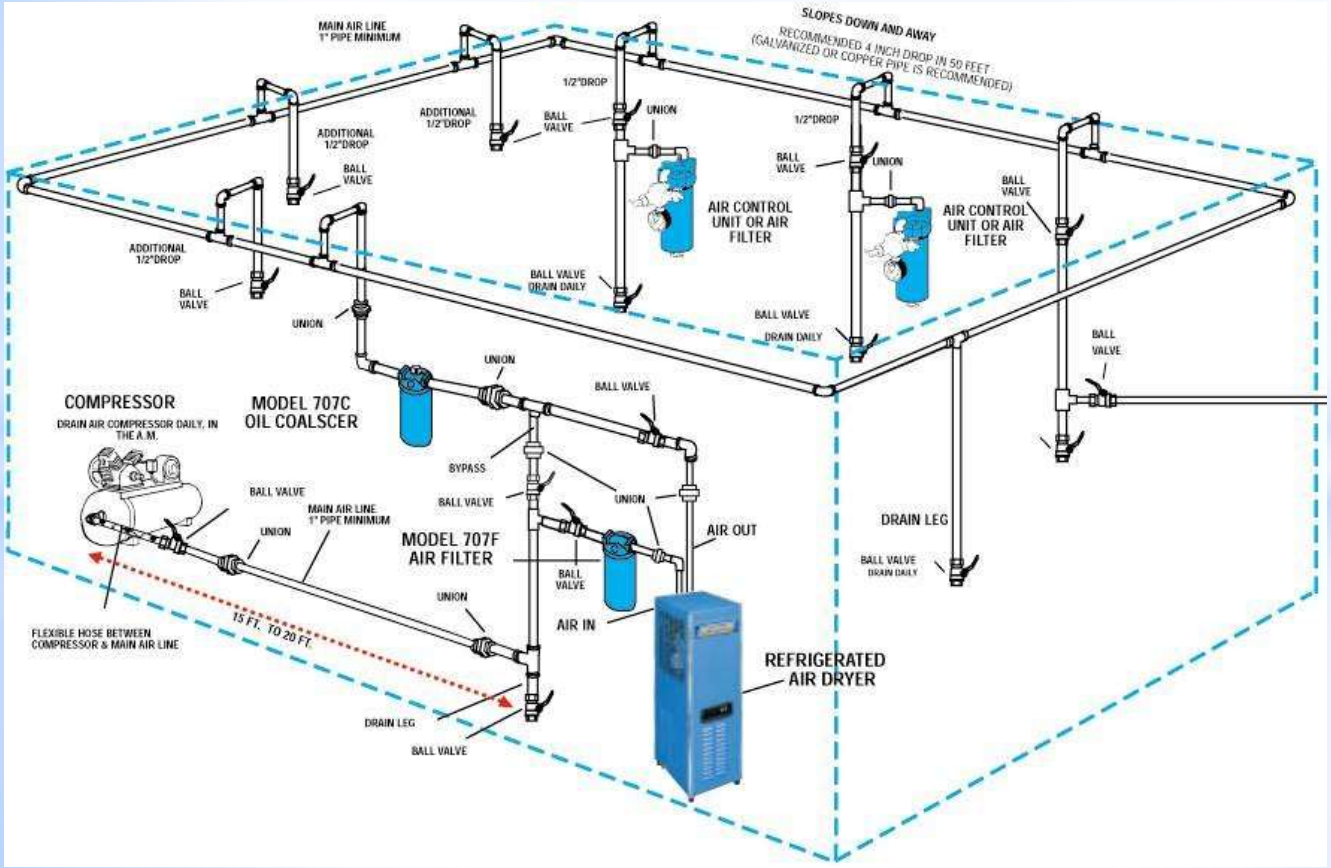
Med Gas 1-Line Diagrams

3D Isometric Diagram



Med Gas 1-Line Diagrams

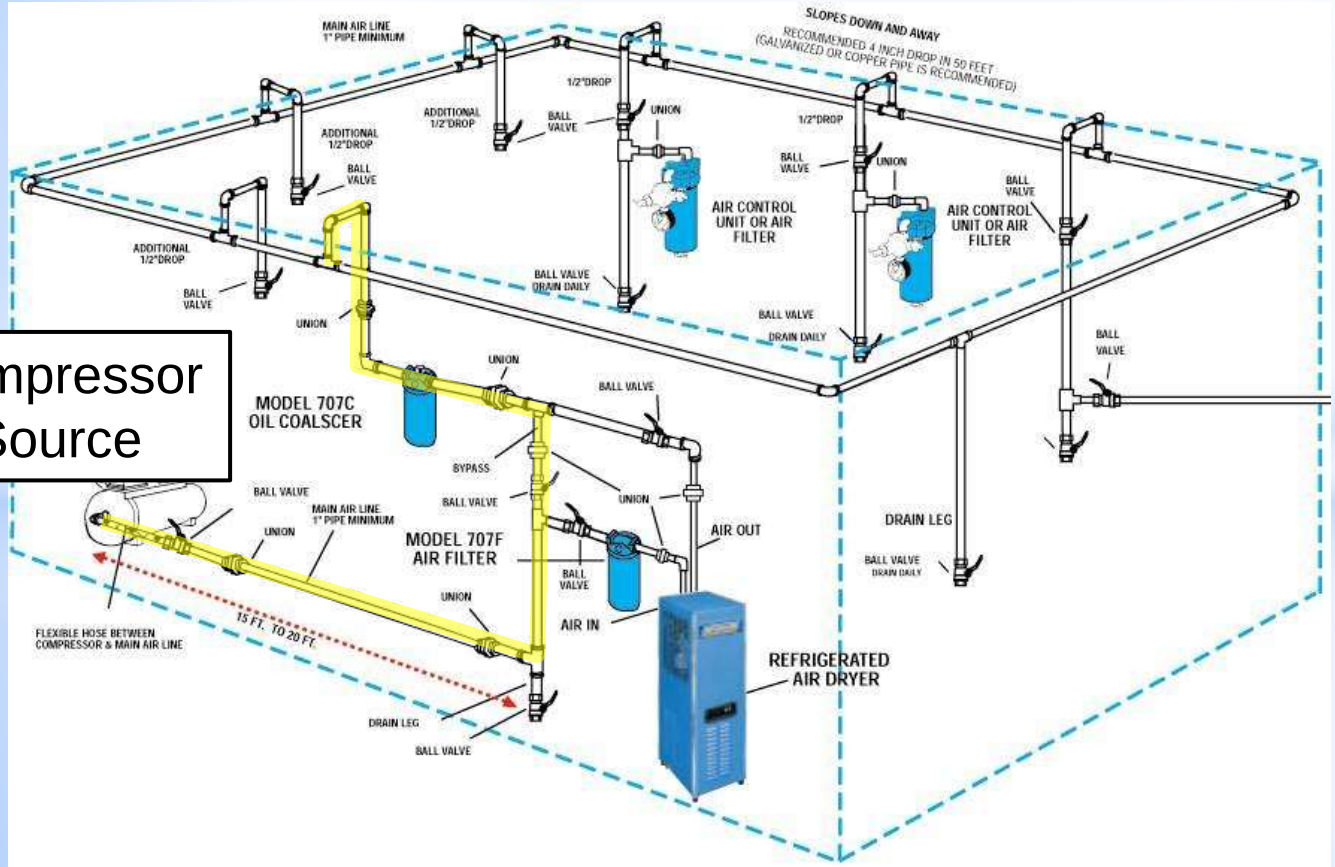
3D Isometric Diagram for Air



Med Gas 1-Line Diagrams

Air Isometric

TRACING

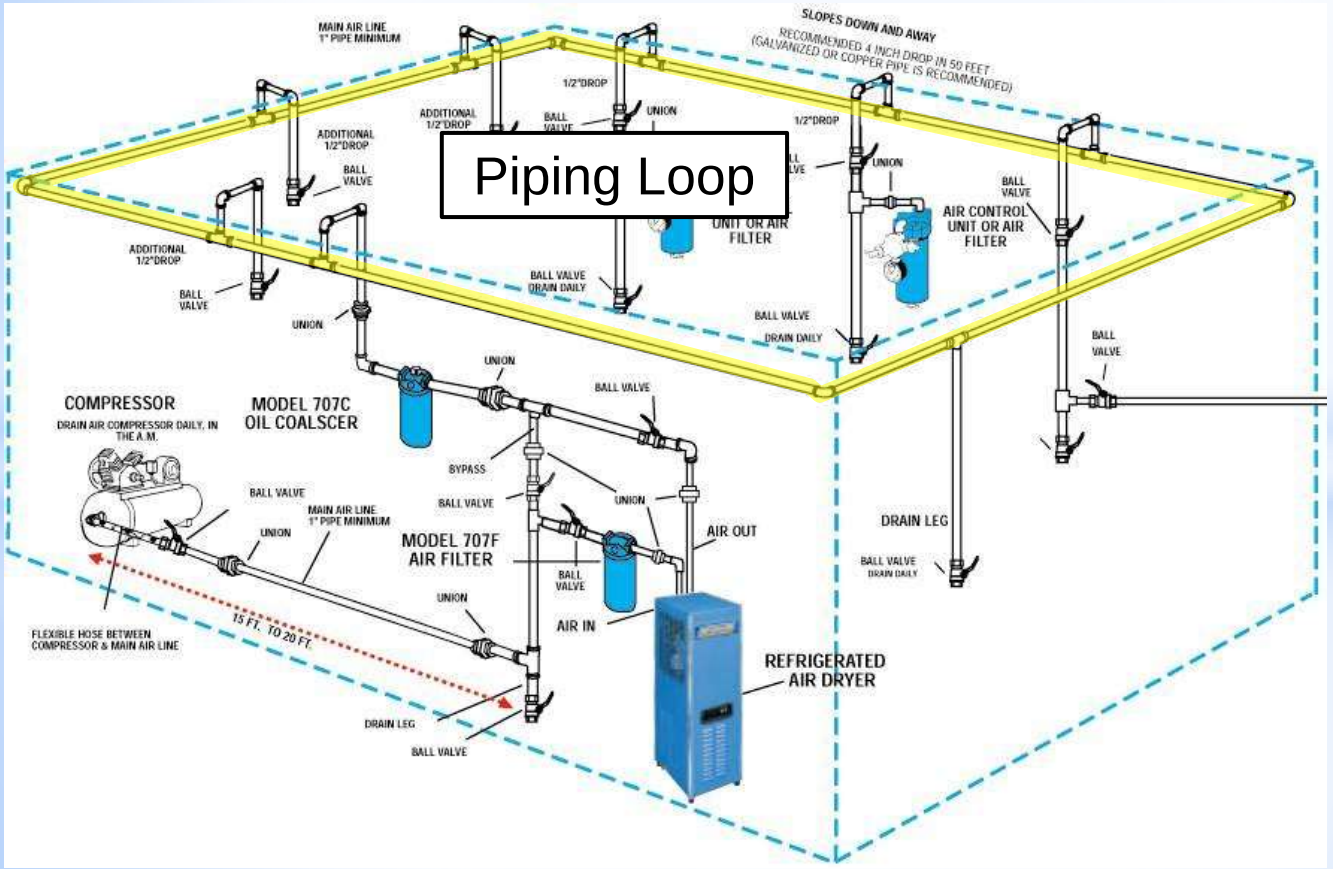


Compressor Source

Med Gas 1-Line Diagrams

Air Isometric

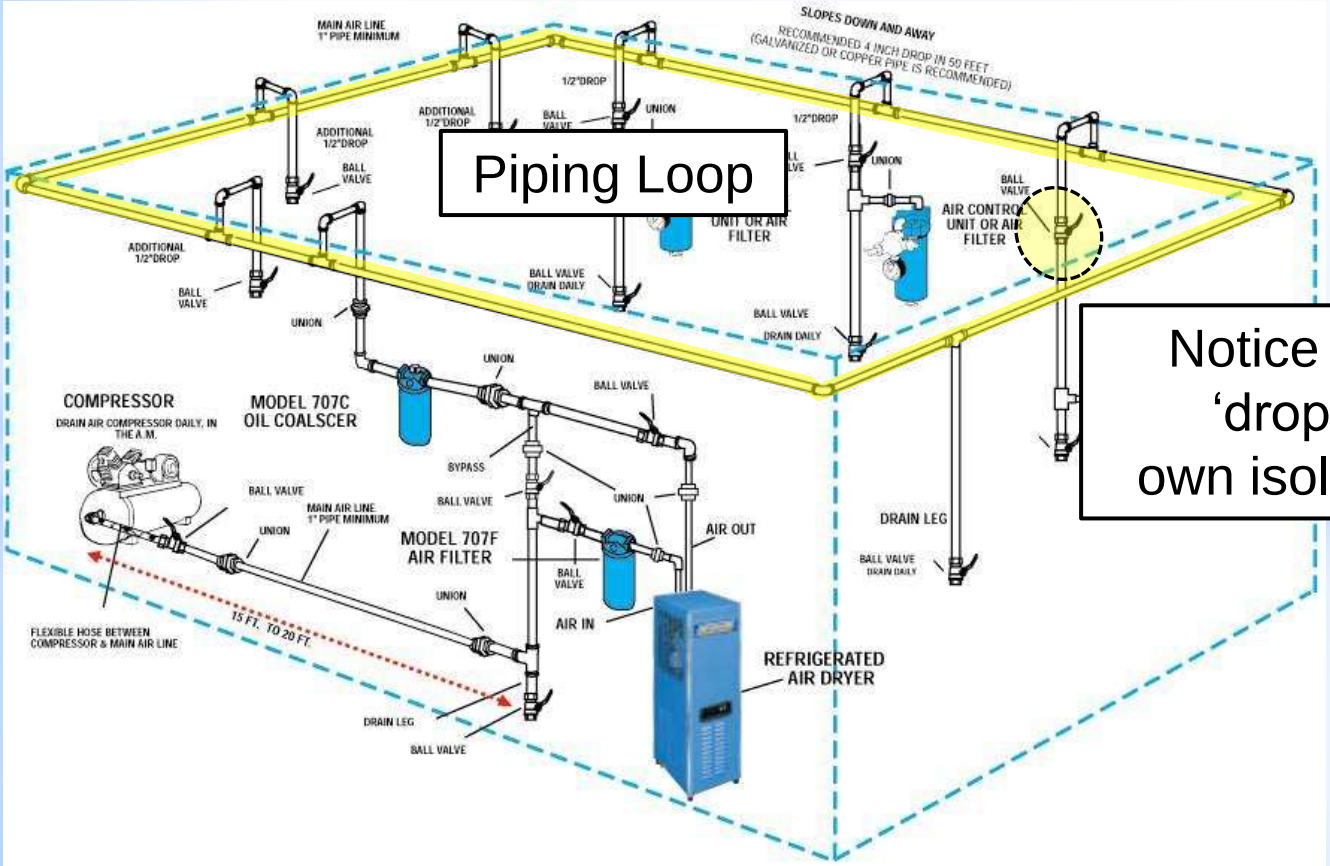
TRACING



Med Gas 1-Line Diagrams

Air Isometric

TRACING

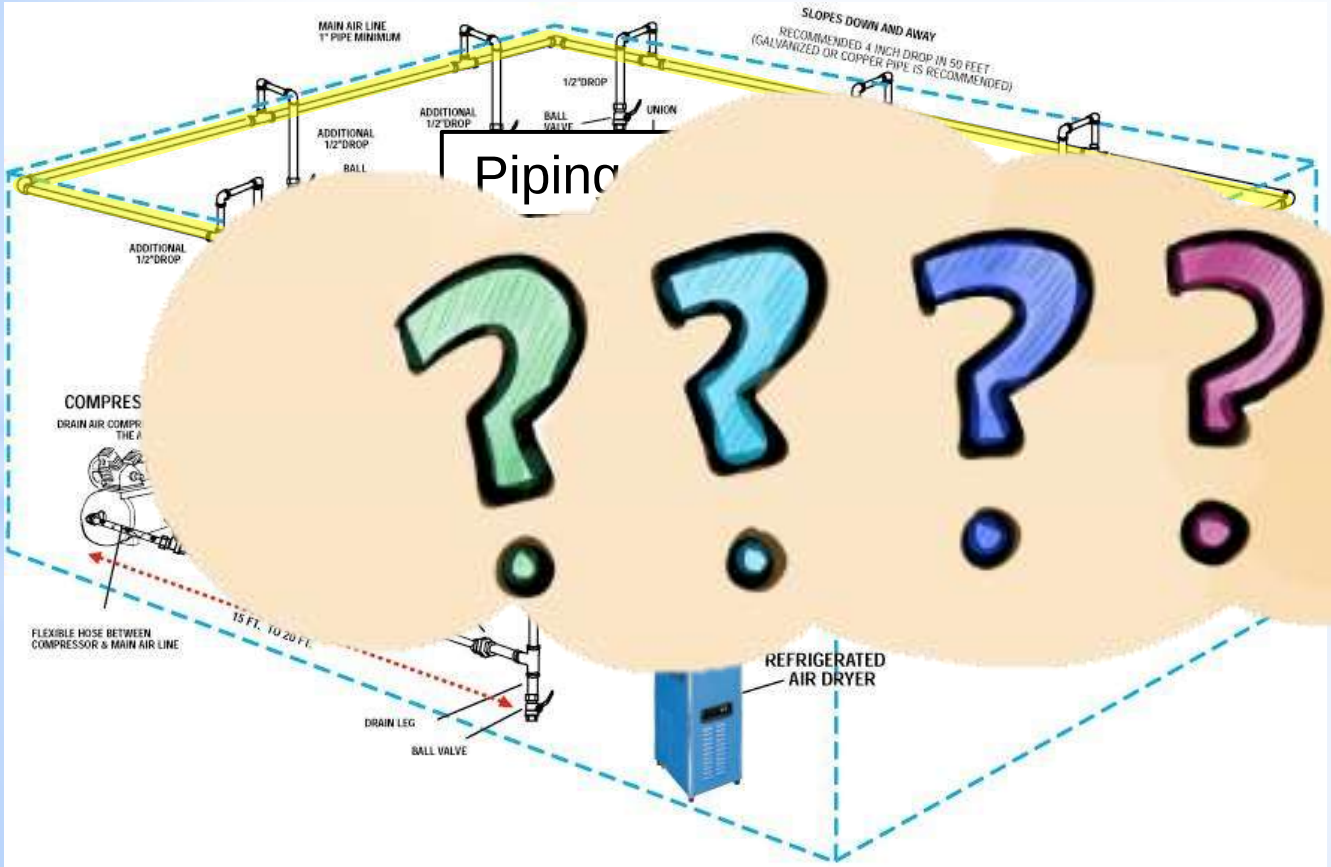


Notice that each ‘drop’ has its own isolation valve

Med Gas 1-Line Diagrams

Air Isometric

TRACING



ach
s
alve

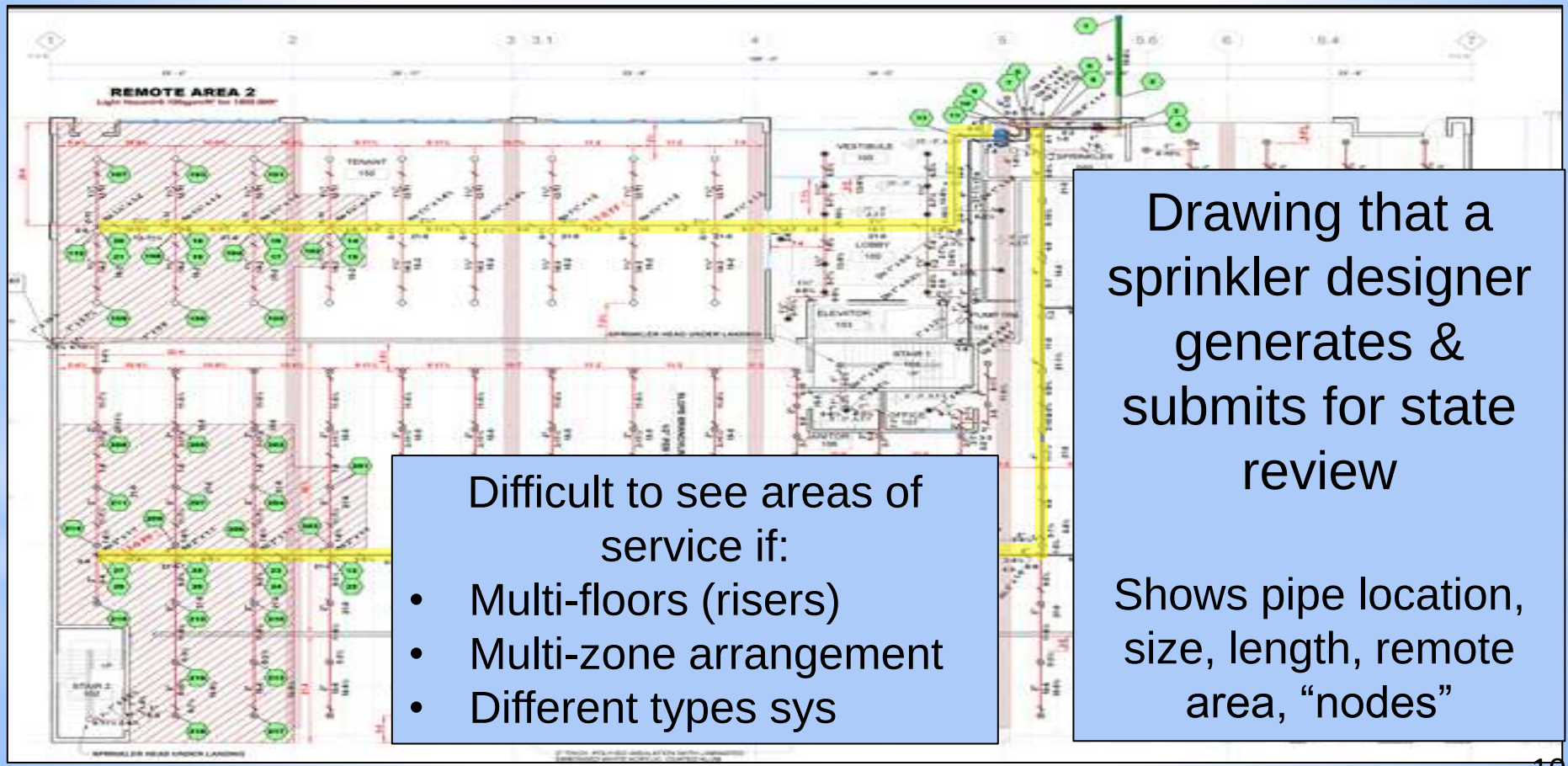
Bill Lauzon

One-Line Diagrams

1. Electrical 1-Lines
2. Plumbing 1-Lines
3. HVAC 1-Lines
4. Med Gas 1-Lines
5. Sprinkler 1-Lines

Sprinkler 1-Line Diagrams

Typical Floor Plan



Difficult to see areas of service if:

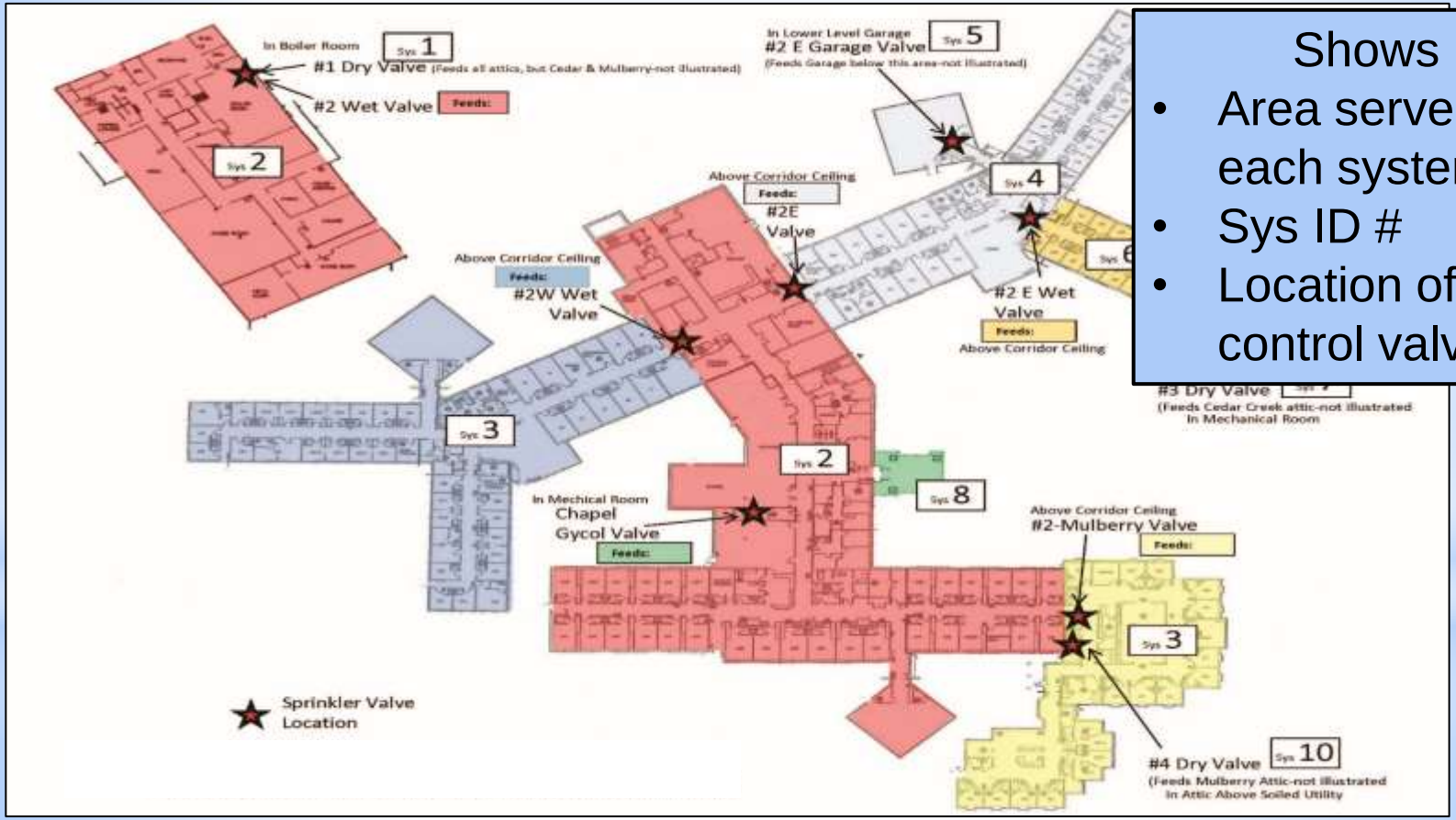
- Multi-floors (risers)
- Multi-zone arrangement
- Different types sys

Drawing that a sprinkler designer generates & submits for state review

Shows pipe location, size, length, remote area, “nodes”

Sprinkler 1-Line Diagrams

Typical Floor Plan

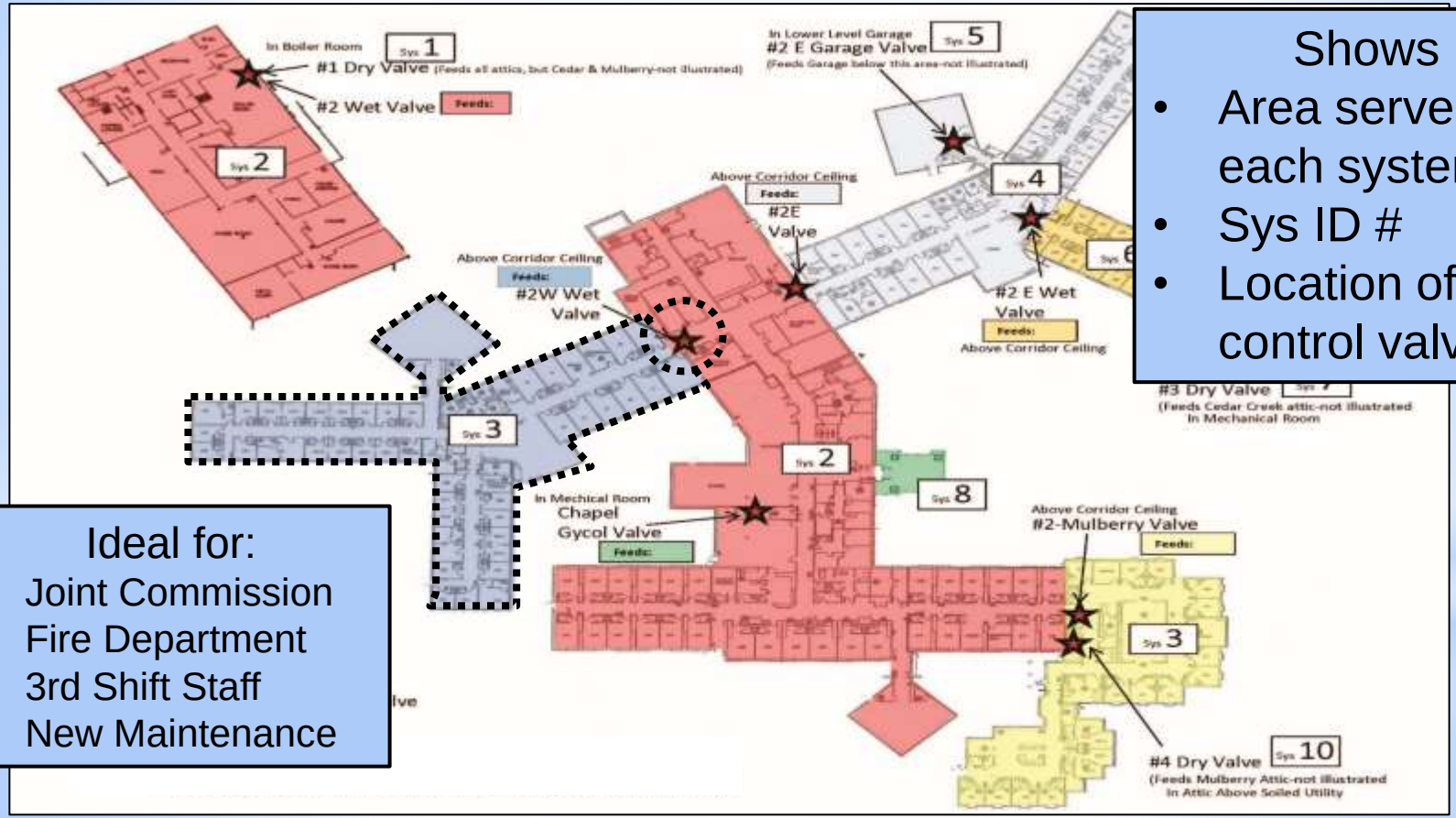


Shows

- Area served by each system
- Sys ID #
- Location of control valve

Sprinkler 1-Line Diagrams

Typical Floor Plan



Shows

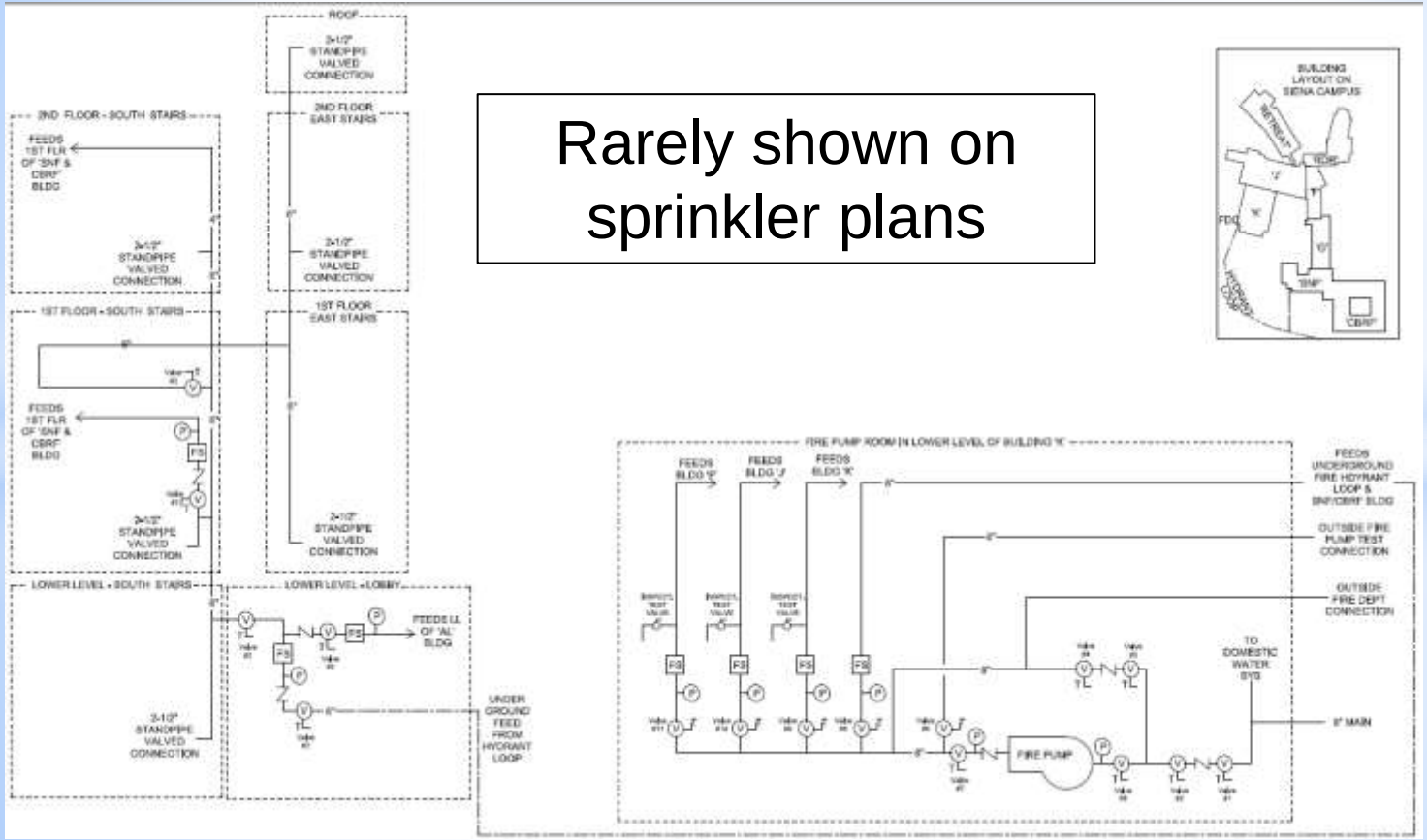
- Area served by each system
- Sys ID #
- Location of control valve

Ideal for:

- Joint Commission
- Fire Department
- 3rd Shift Staff
- New Maintenance

Sprinkler 1-Line Diagrams

Riser Diagram

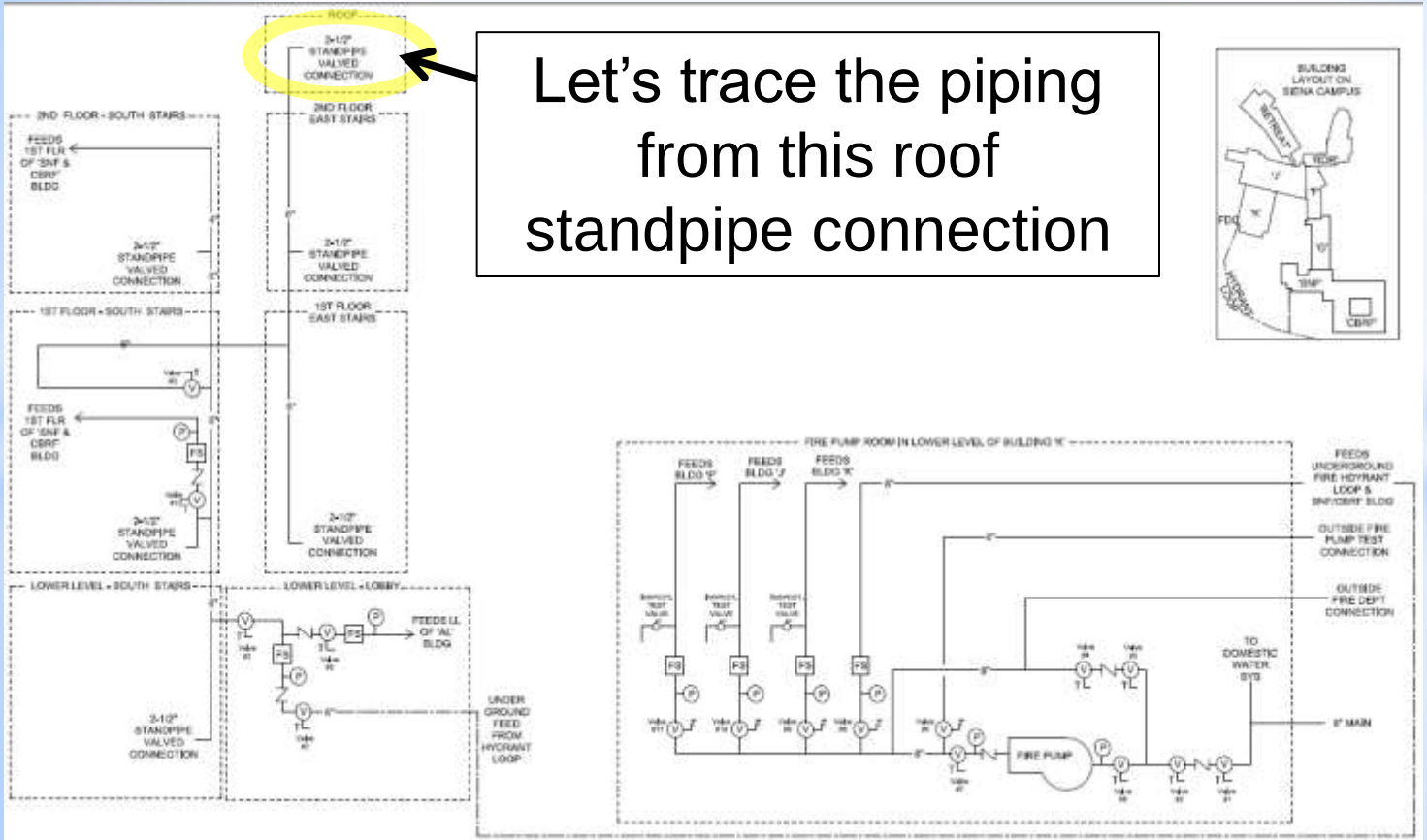


Rarely shown on sprinkler plans

Sprinkler 1-Line Diagrams

Riser Diagram

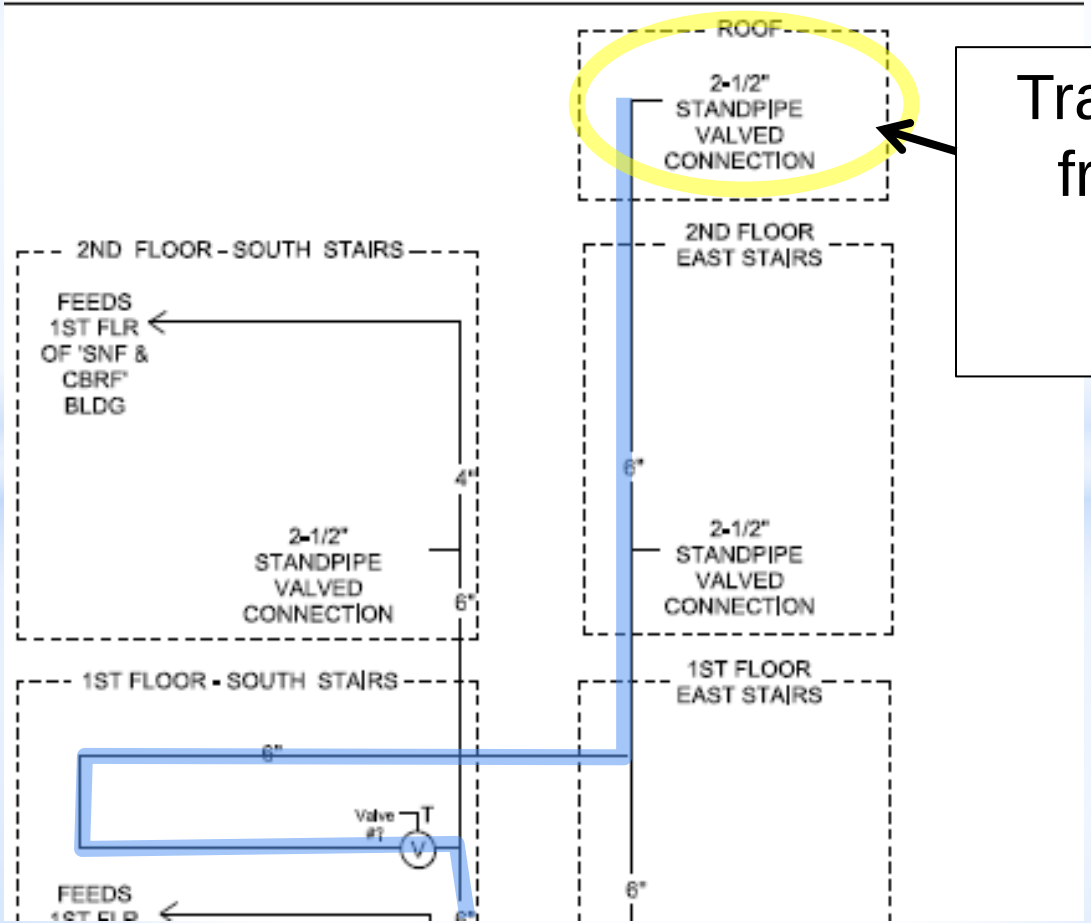
TRACING



Sprinkler 1-Line Diagrams

Riser Diagram

TRACING

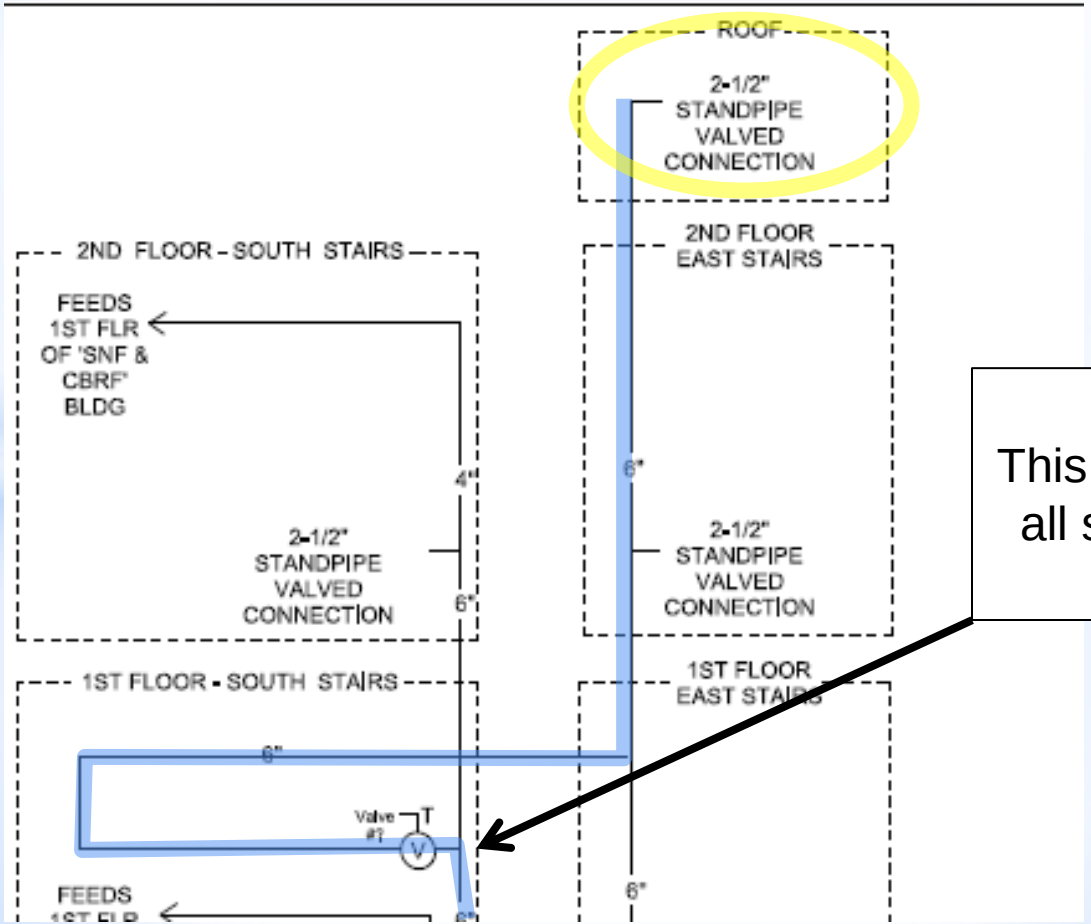


Trace the piping from this roof standpipe connection

Sprinkler 1-Line Diagrams

Riser Diagram

TRACING

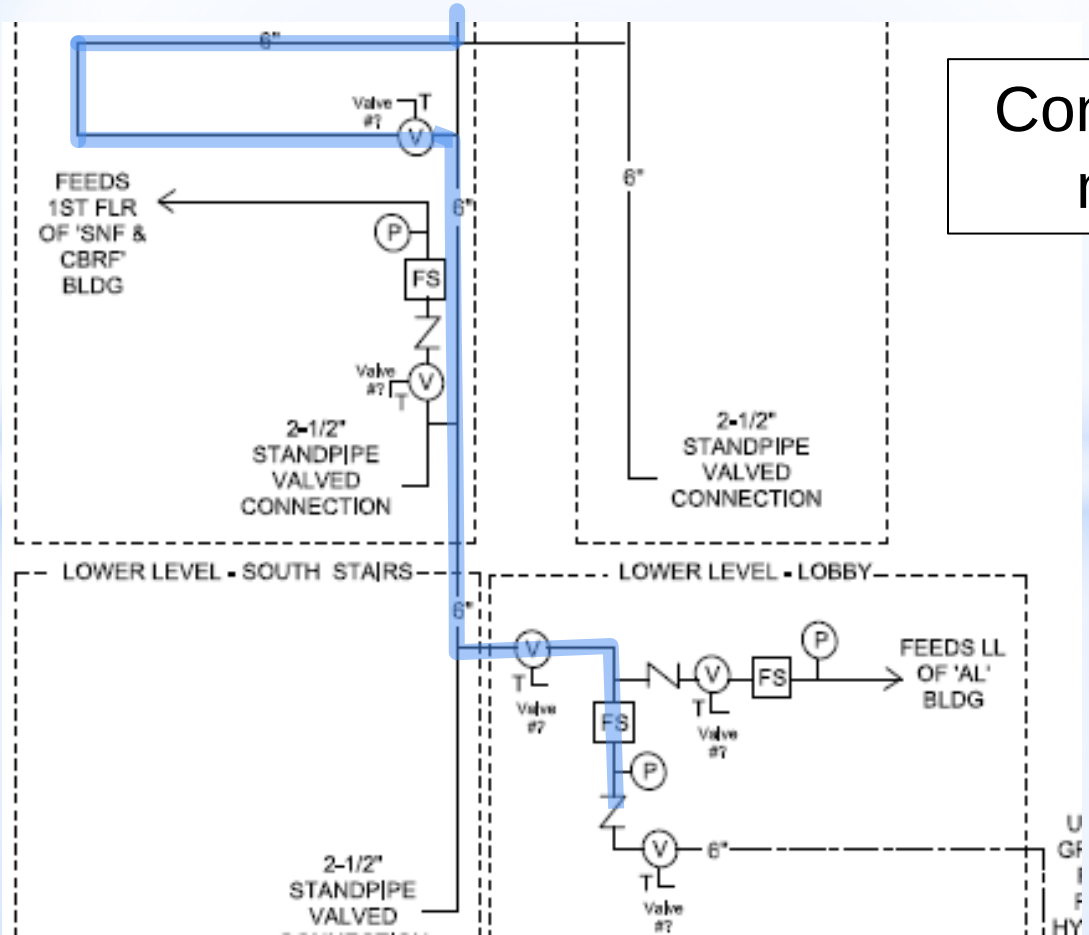


Note:
This valve shuts down all standpipes in the East Stairs

Sprinkler 1-Line Diagrams

Riser Diagram

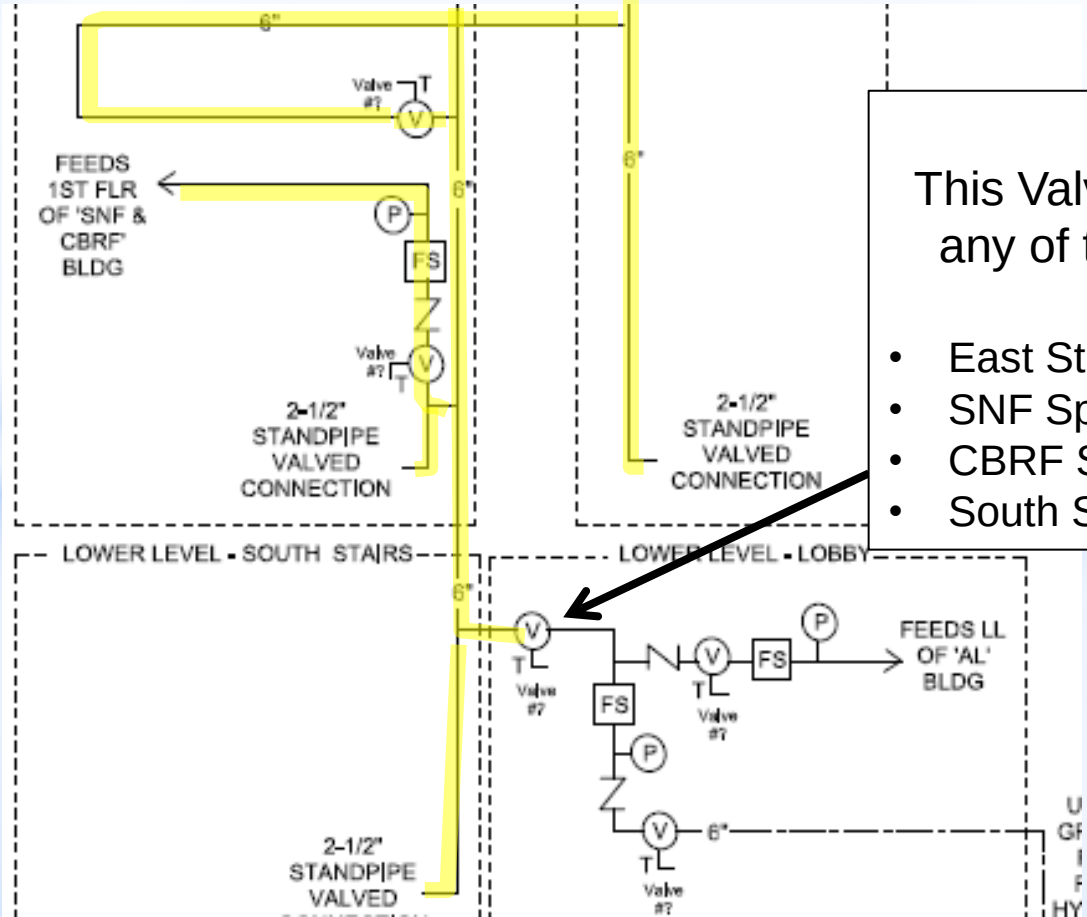
TRACING



Continuing to the next valves

Sprinkler 1-Line Diagrams

Riser Diagram | TRACING

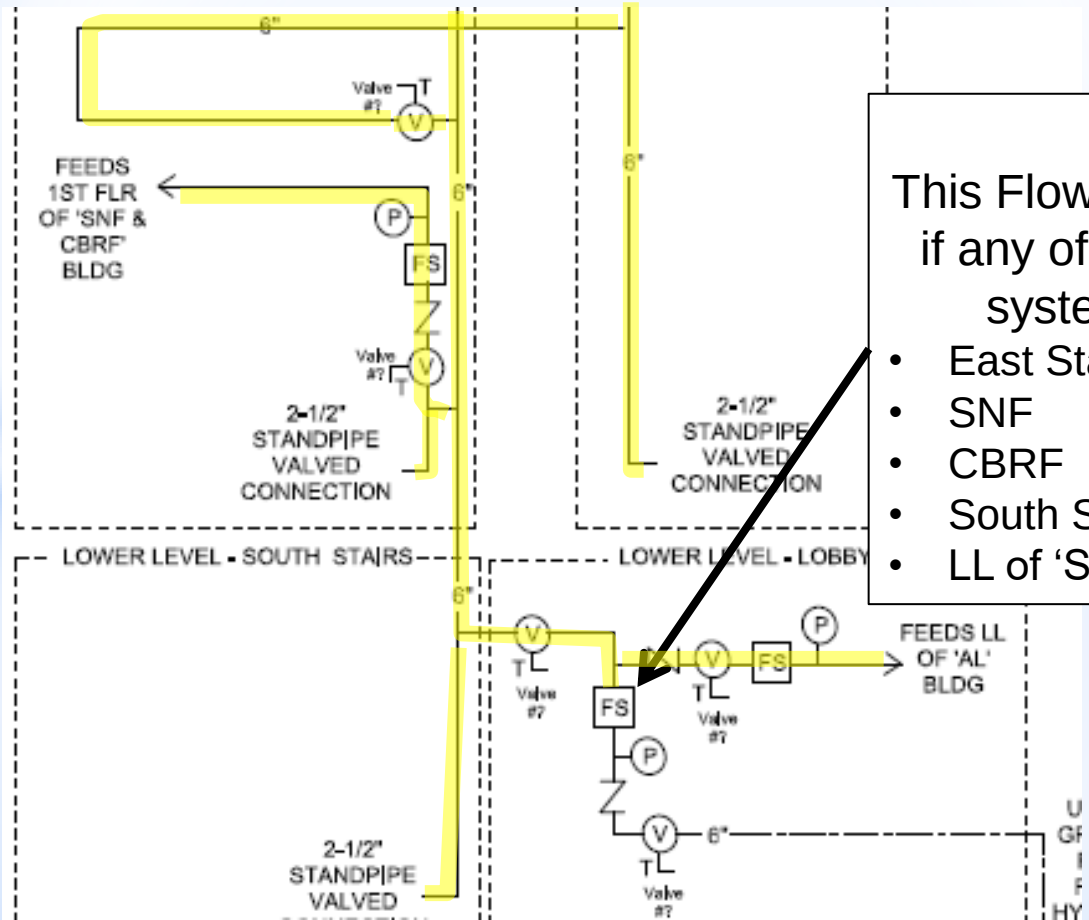


Note:
This Valve will shut-down any of the downstream systems:

- East Stair Standpipes
- SNF Sprinklers
- CBRF Sprinklers
- South Stair Standpipe

Sprinkler 1-Line Diagrams

Riser Diagram | TRACING

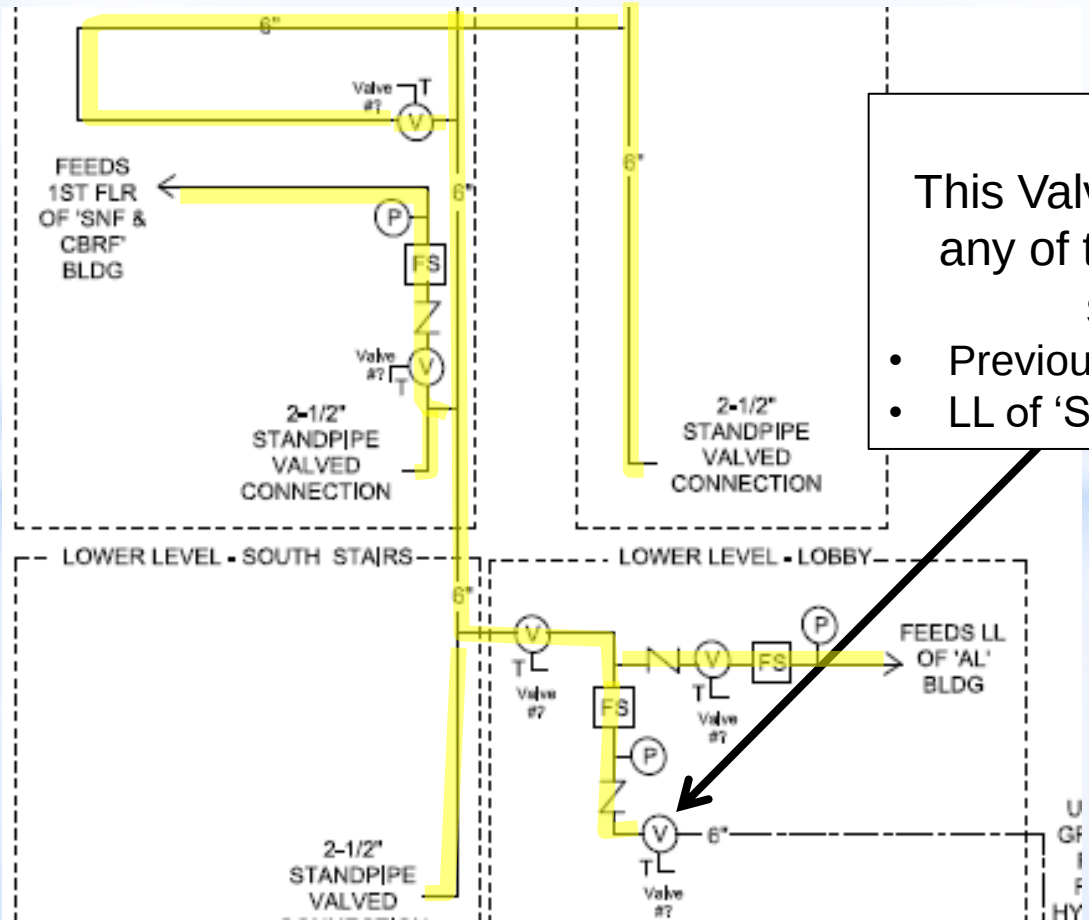


Note:
This Flow Switch will signal if any of the downstream systems are used:

- East Stair Standpipes
- SNF
- CBRF
- South Stair Standpipe
- LL of 'SL' Bldg

Sprinkler 1-Line Diagrams

Riser Diagram | TRACING



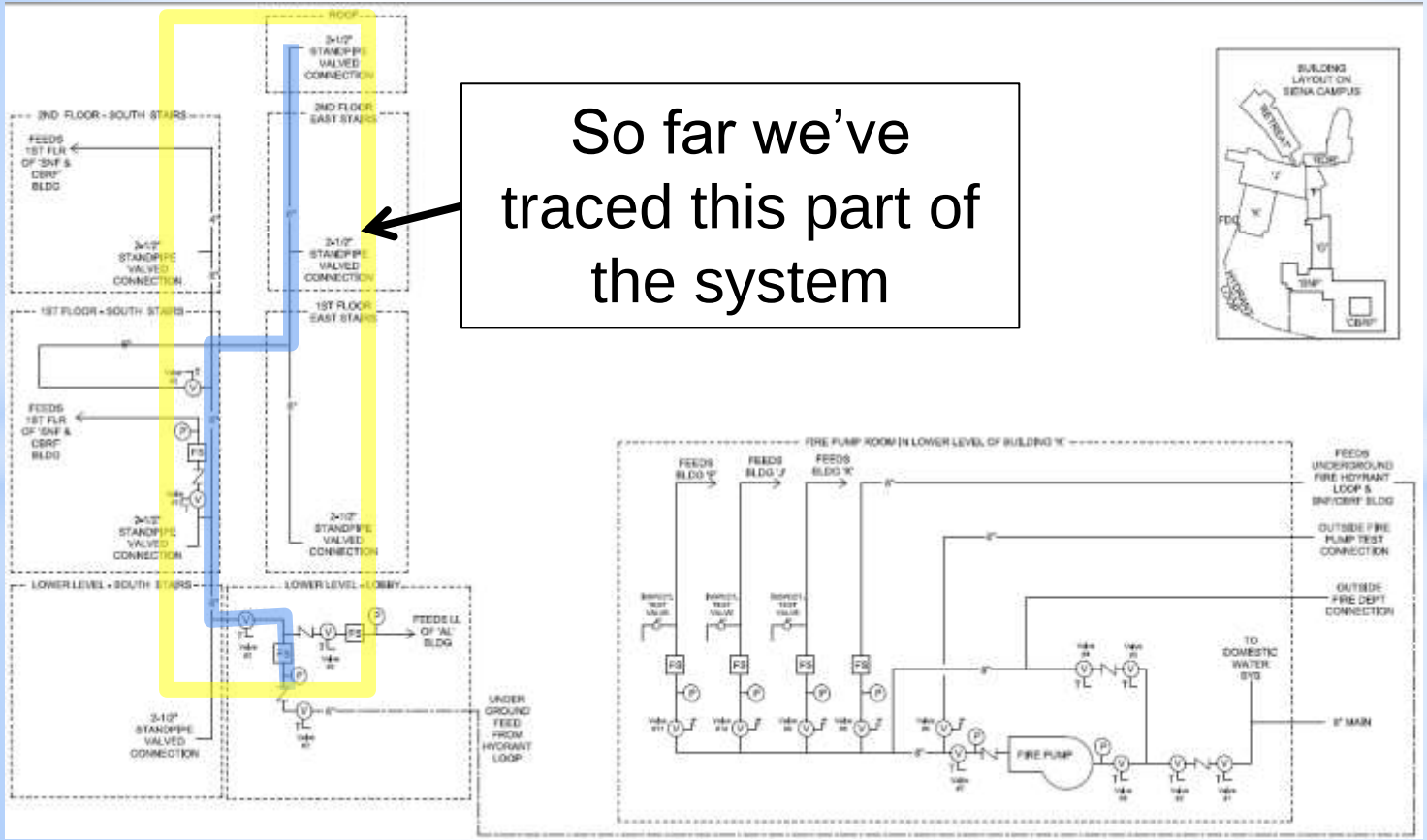
Note:
This Valve will shut-down any of the downstream systems:

- Previous systems
- LL of 'SL' Bldg

Sprinkler 1-Line Diagrams

Riser Diagram

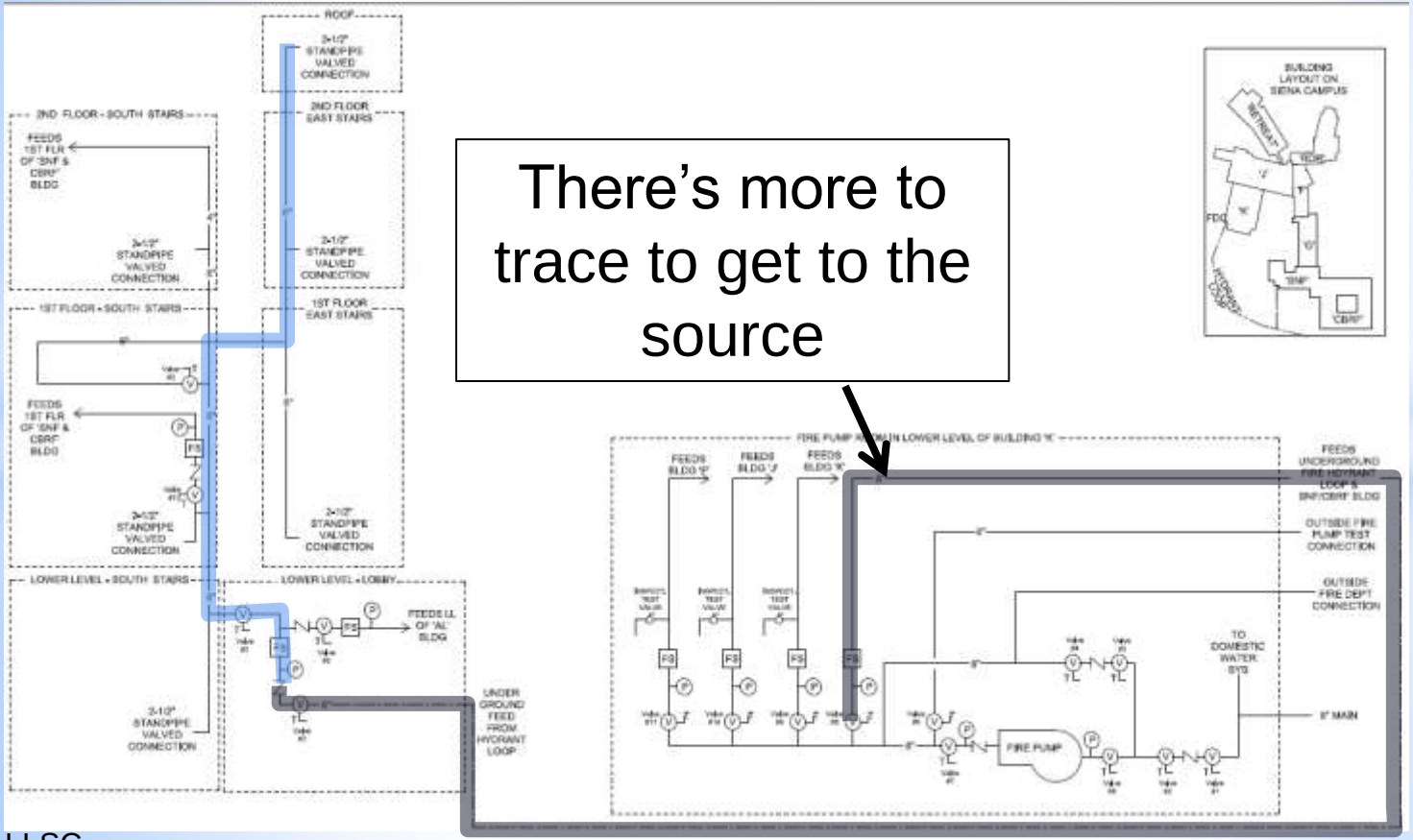
TRACING



Sprinkler 1-Line Diagrams

Riser Diagram

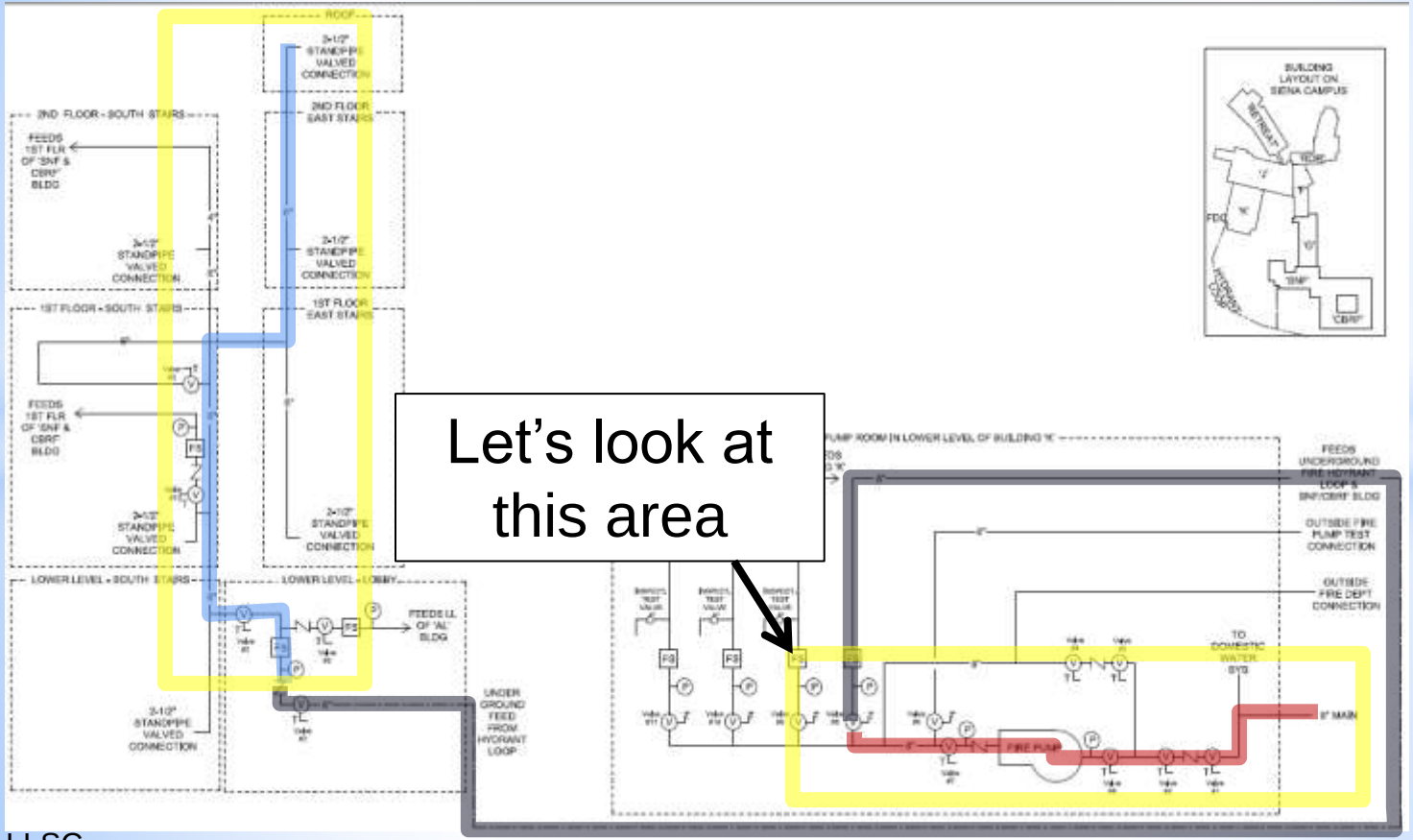
TRACING



Sprinkler 1-Line Diagrams

Riser Diagram

TRACING



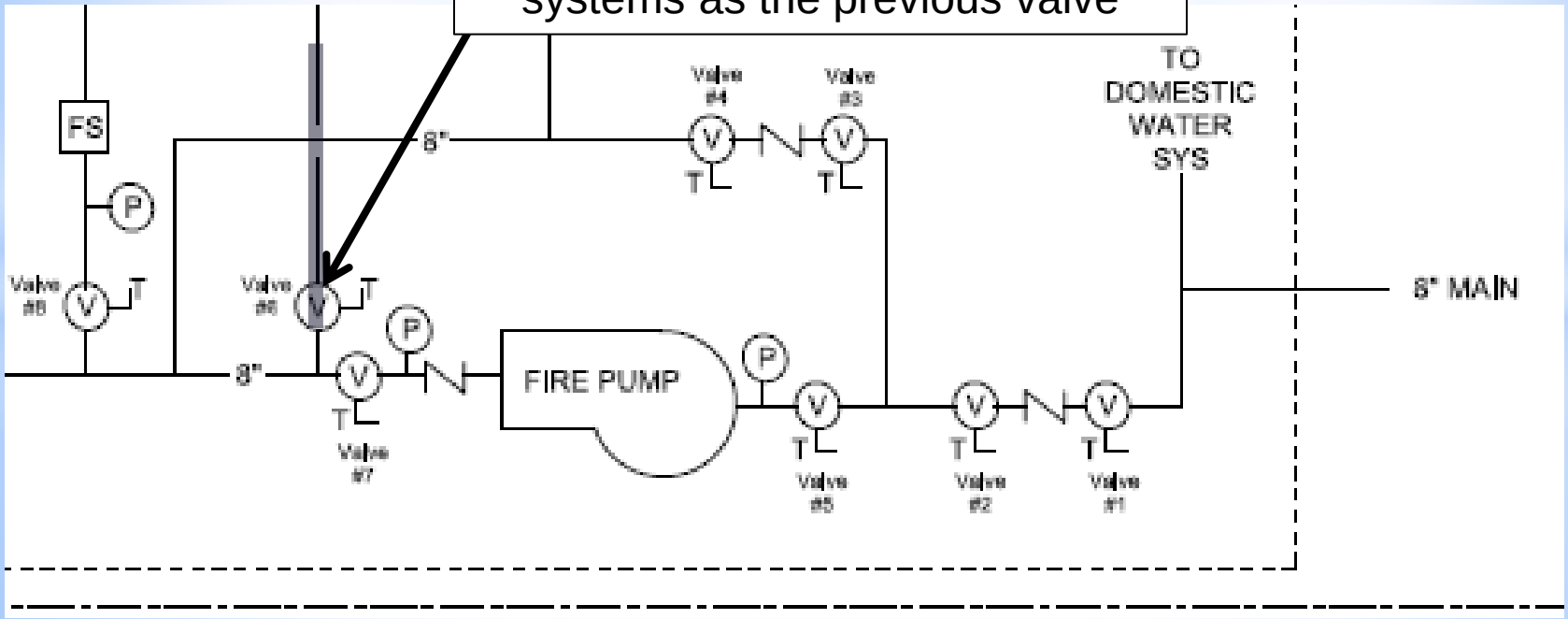
Let's look at this area

Sprinkler 1-Line Diagrams

Riser Diagram

TRACING

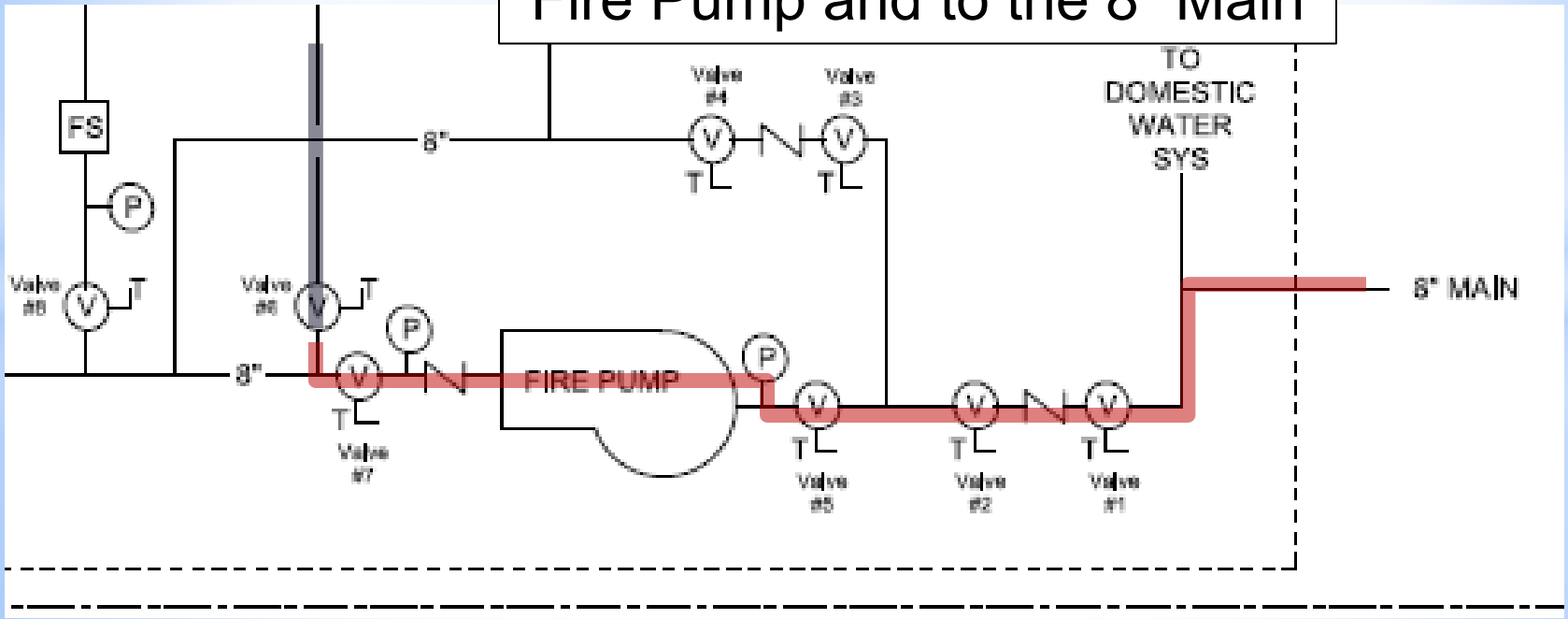
Note:
This valve shuts-down the same systems as the previous valve



Sprinkler 1-Line Diagrams

Riser Diagram | TRACING

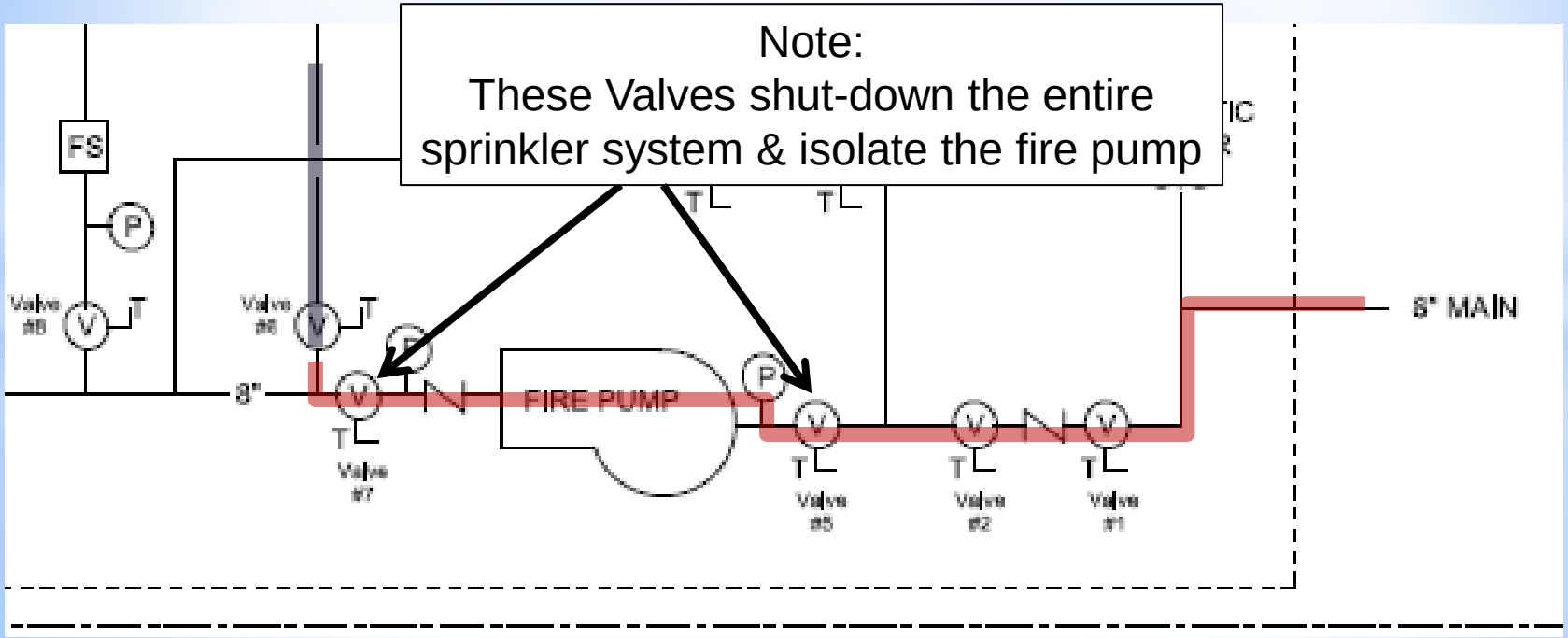
Continuing to the
Fire Pump and to the 8” Main



Sprinkler 1-Line Diagrams

Riser Diagram

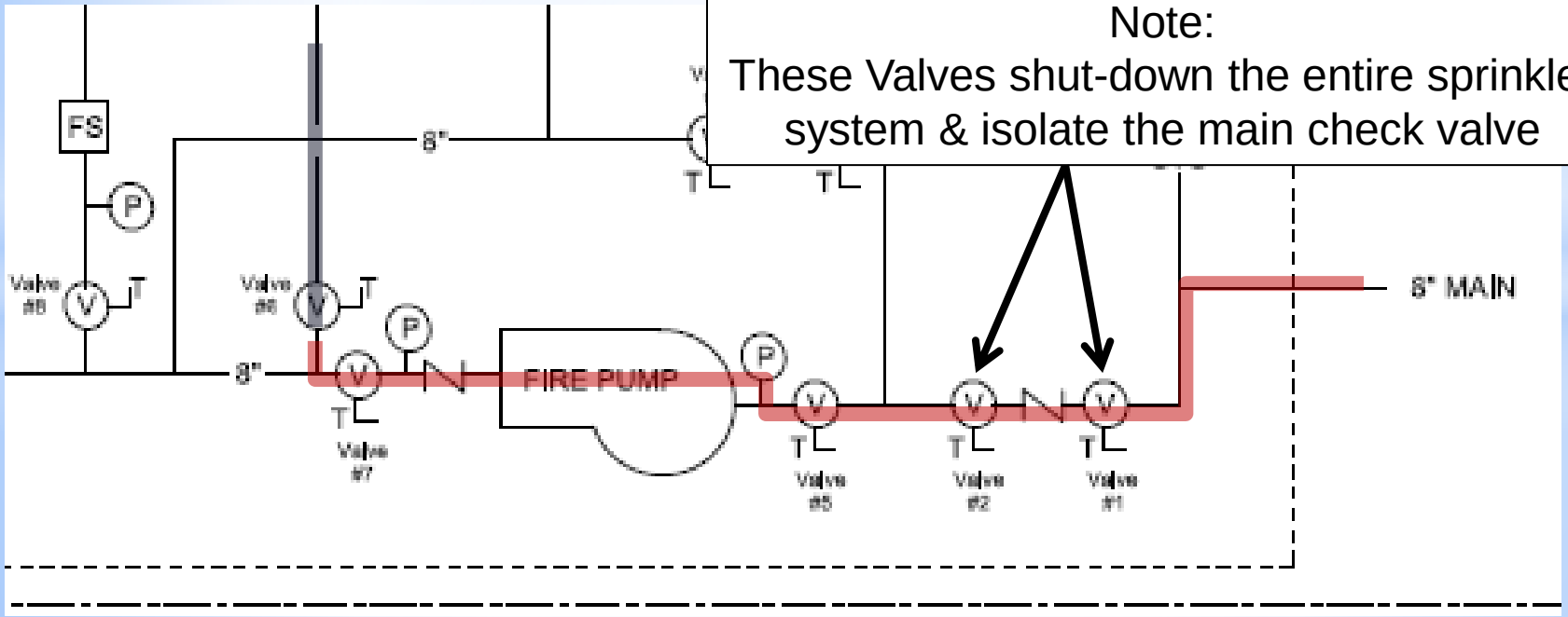
TRACING



Sprinkler 1-Line Diagrams

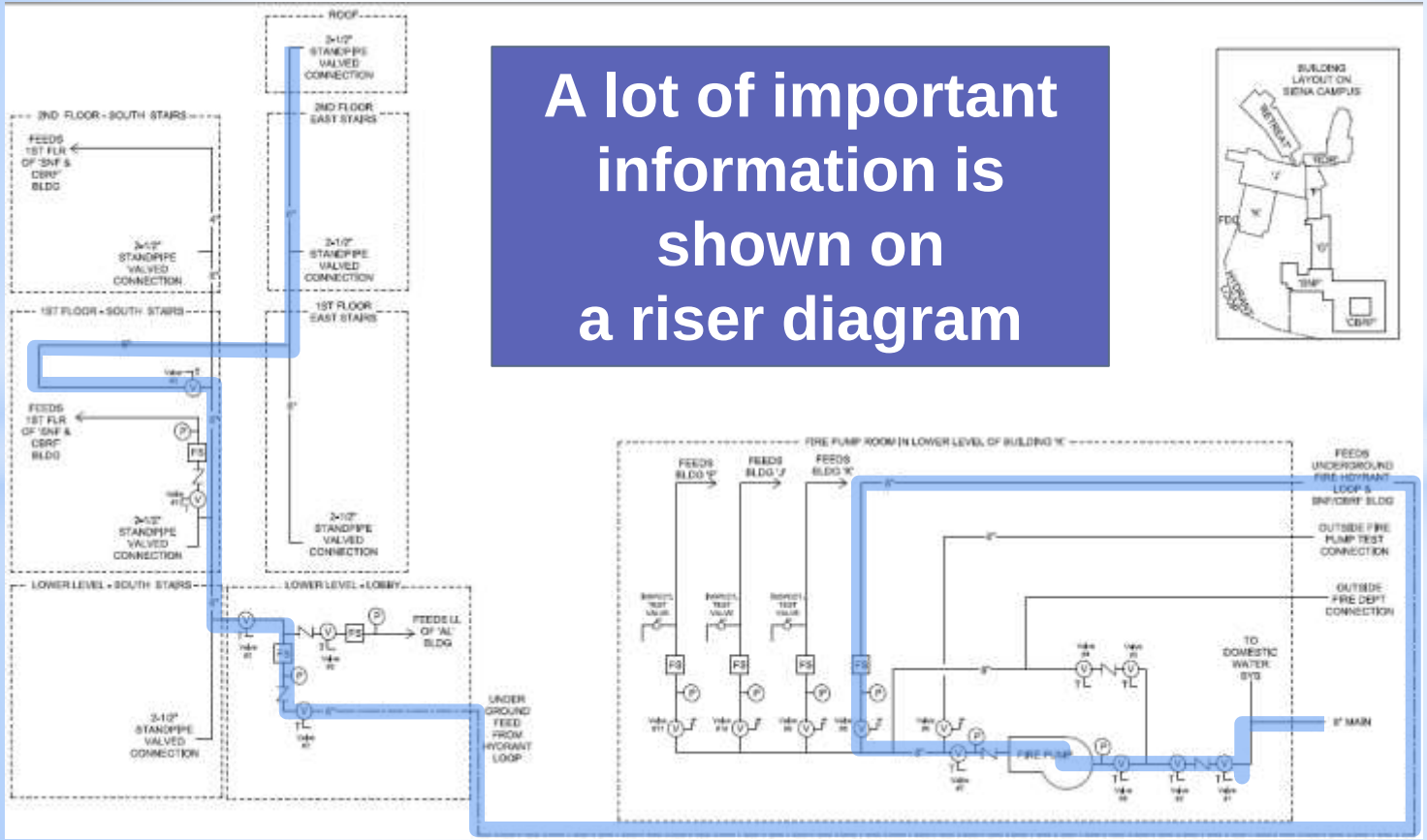
Riser Diagram

TRACING



Sprinkler 1-Line Diagrams

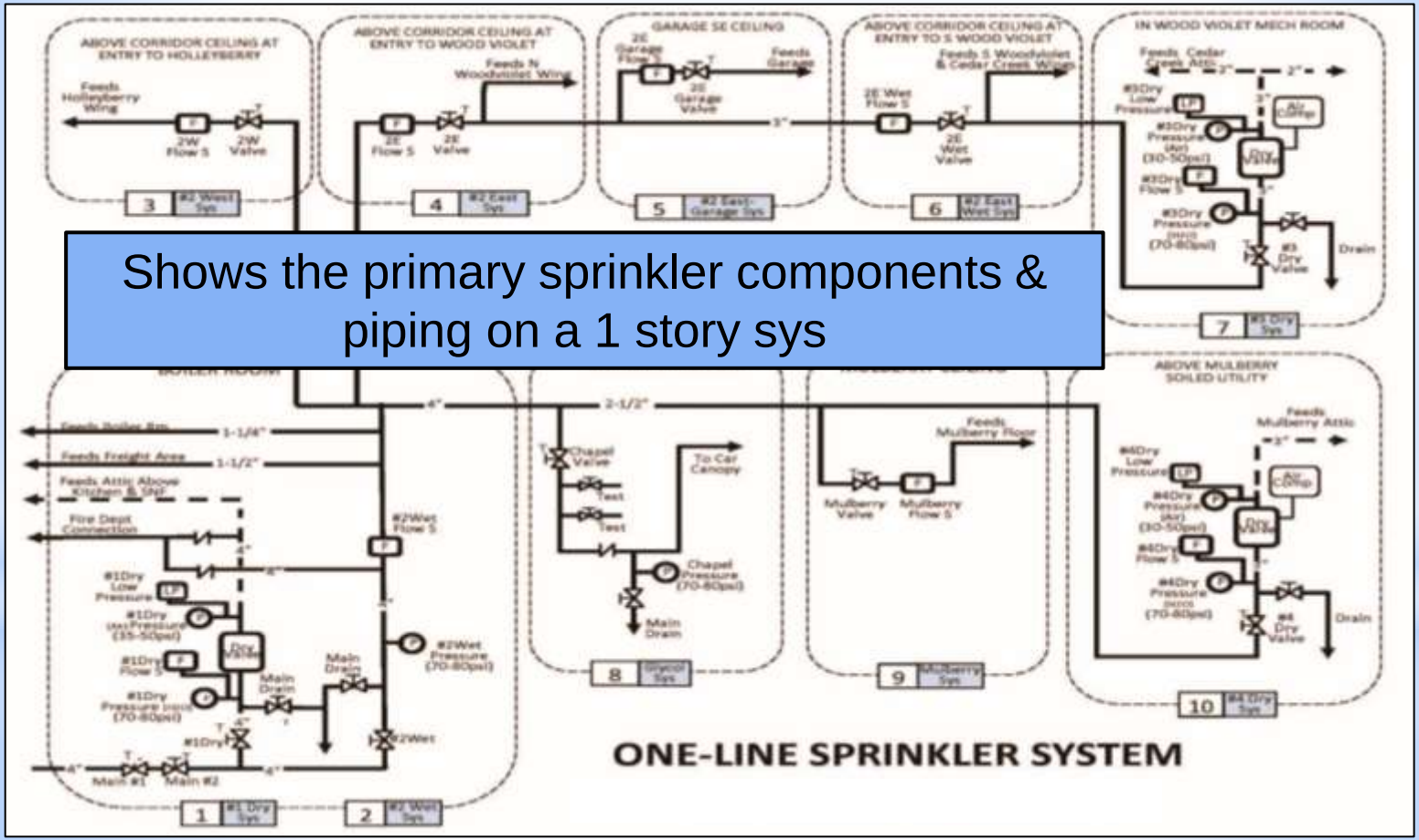
Riser Diagram



A lot of important information is shown on a riser diagram

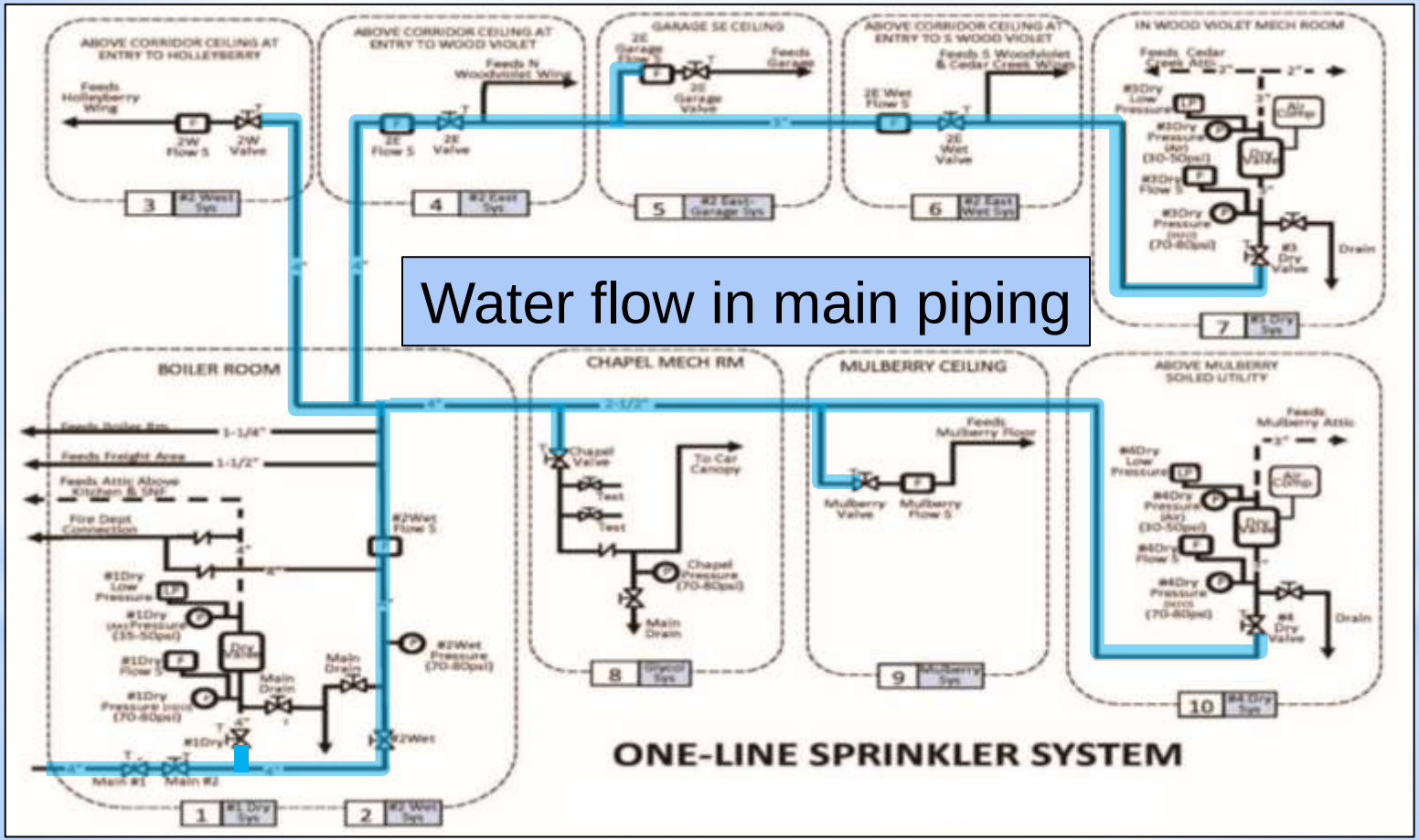
Sprinkler 1-Line Diagrams

Riser Diagram



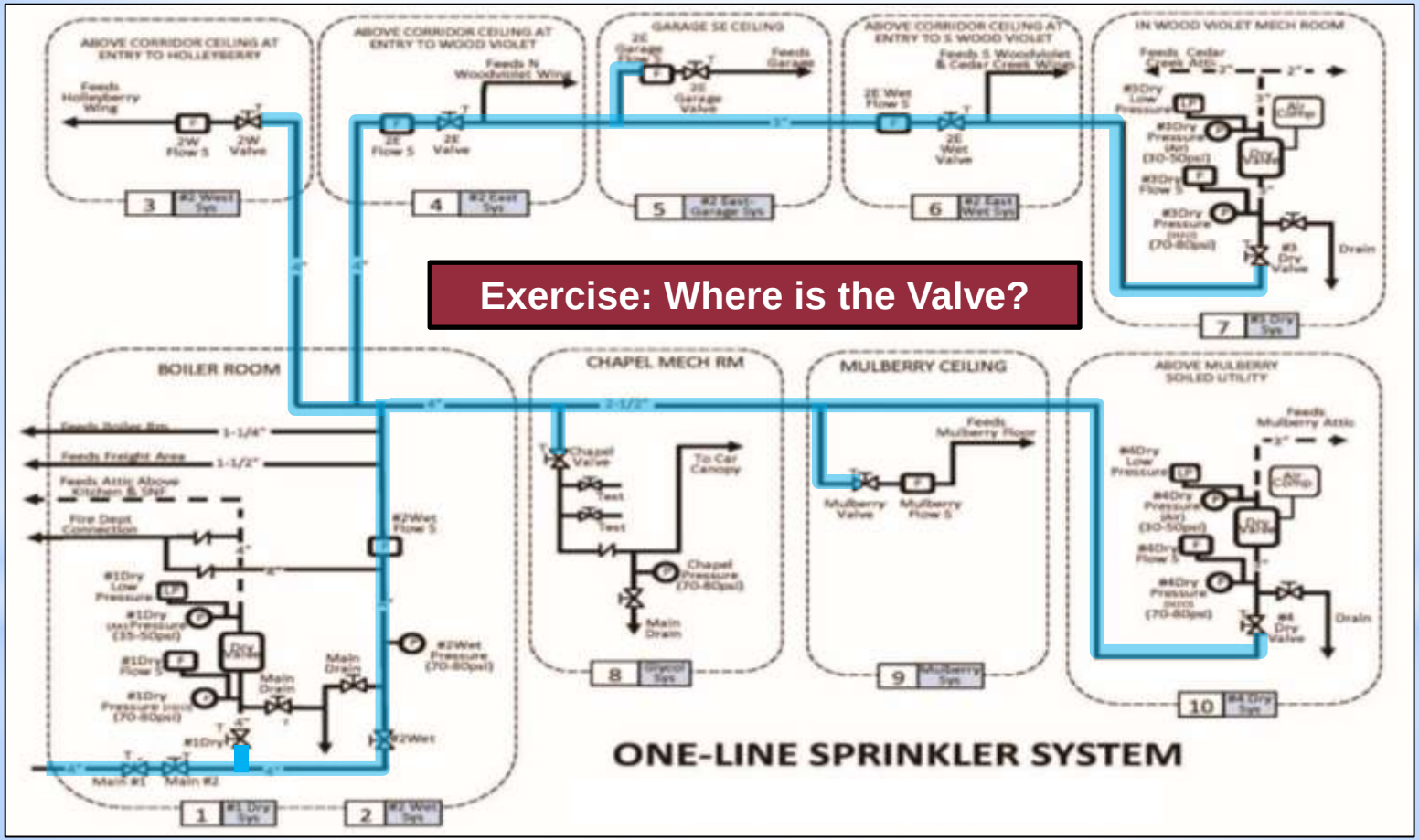
Sprinkler 1-Line Diagrams

Riser Diagram



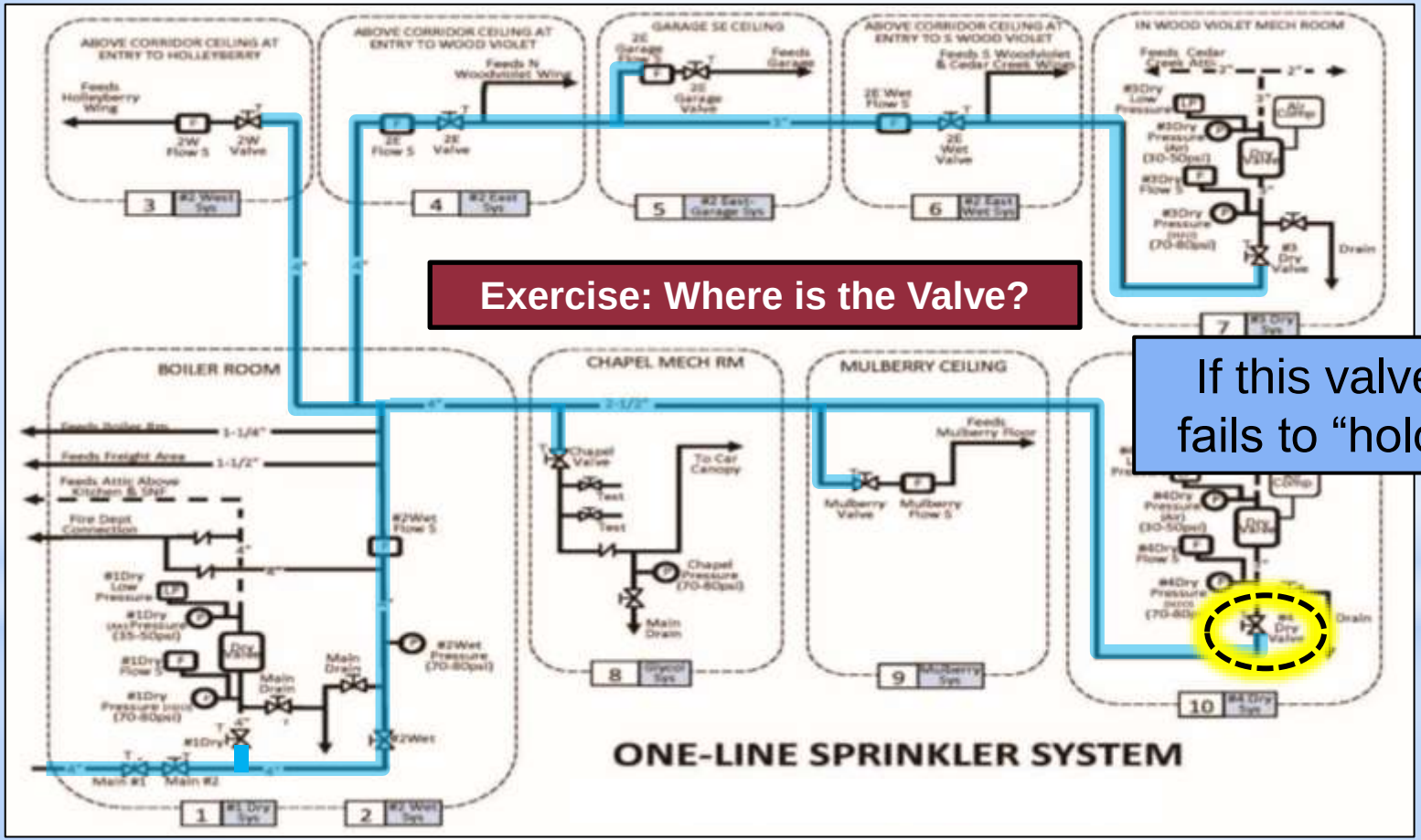
Sprinkler 1-Line Diagrams

Riser Diagram



Sprinkler 1-Line Diagrams

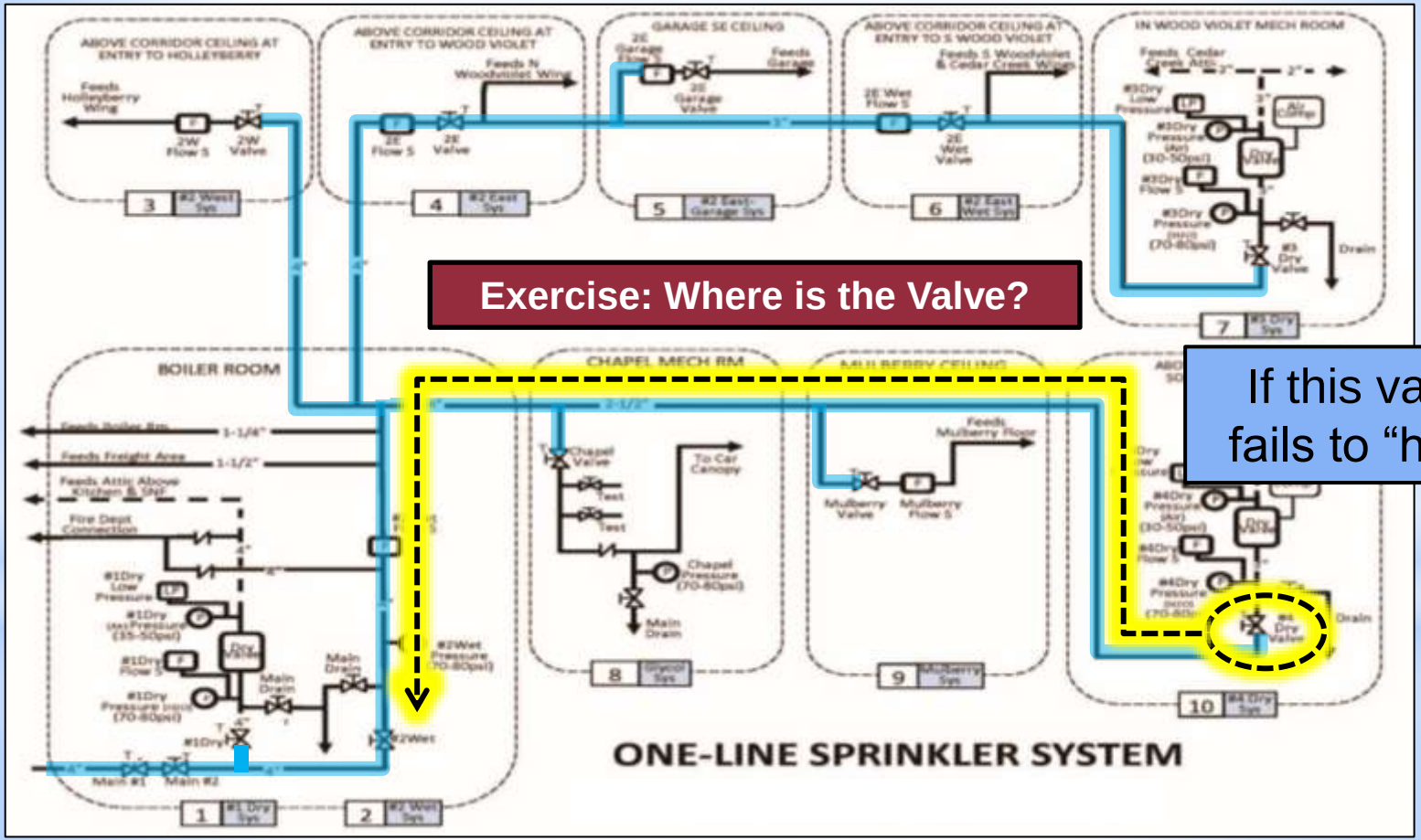
Riser Diagram



Sprinkler 1-Line Diagrams

Riser Diagram

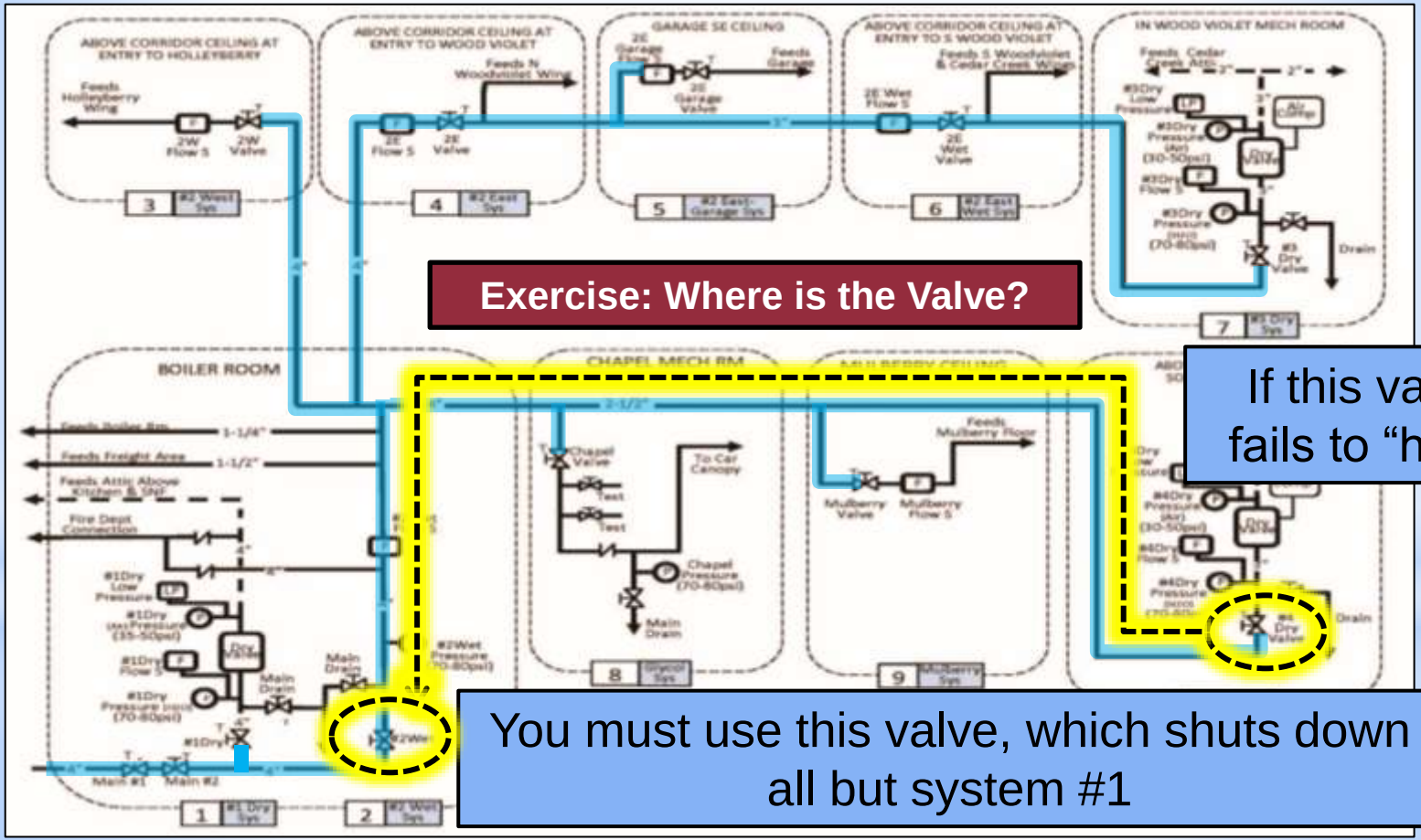
TRACING



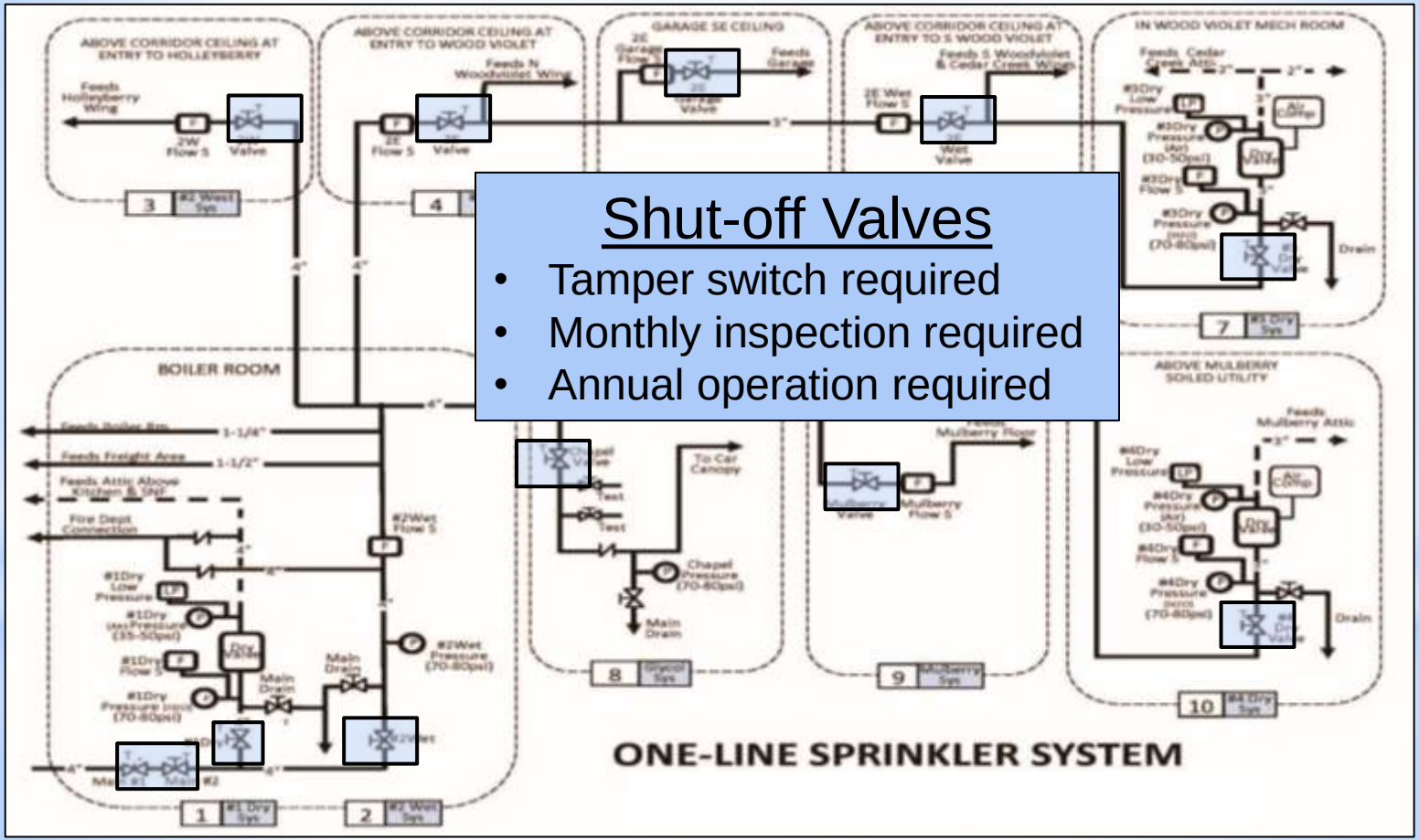
Sprinkler 1-Line Diagrams

Riser Diagram

TRACING

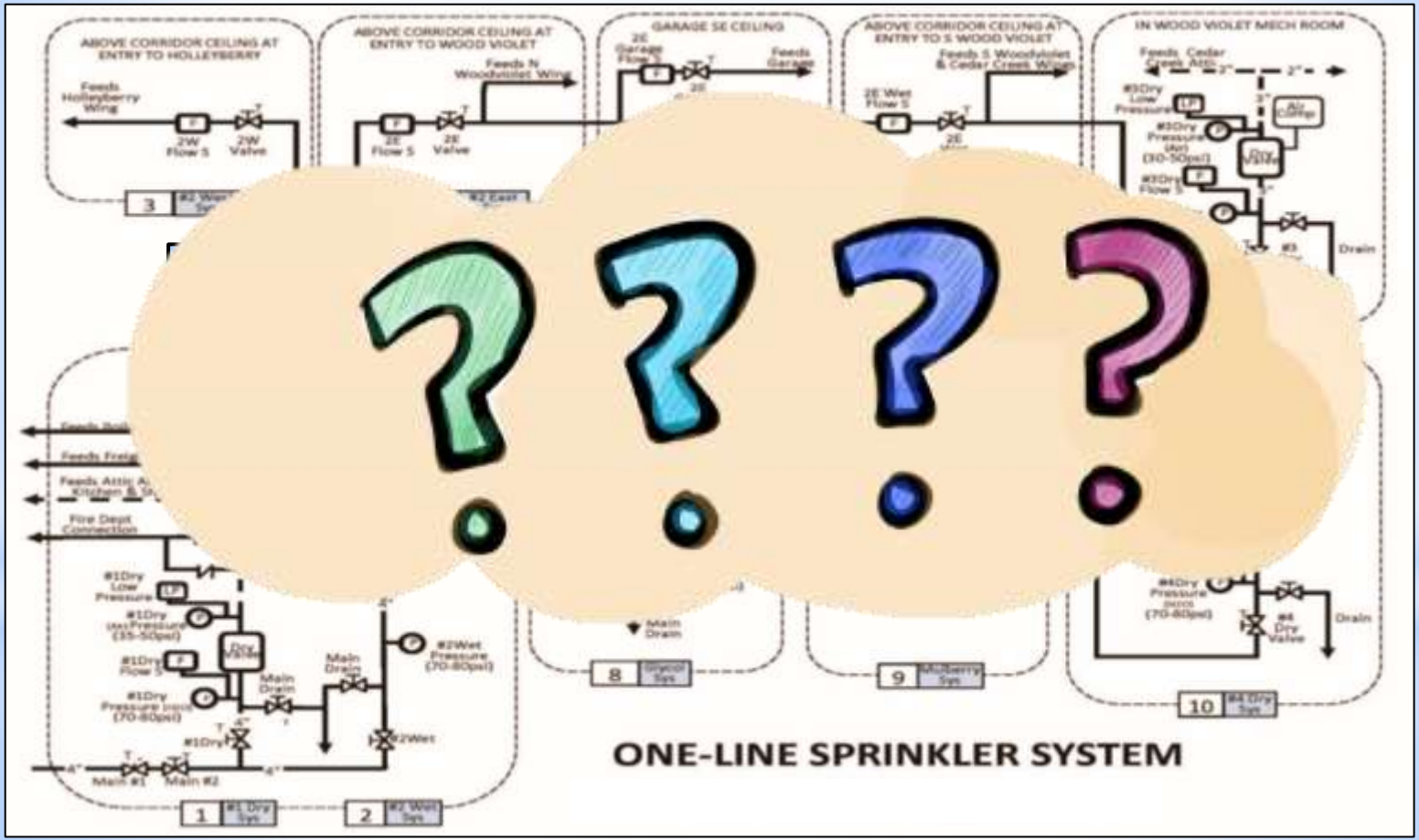


Sprinkler 1-Line Diagrams



Sprinkler 1-Line Diagrams

Riser Diagram



Bill Lauzon

One-Line Diagrams

BONUS: How to Draw 1-Lines

1. Electrical 1-Lines
2. Plumbing 1-Lines
3. HVAC 1-Lines
4. Sprinkler 1-Lines
5. Med Gas 1-Lines

How to Draw 1-Line Diagrams

With MS Power Point

Frequently, it is difficult and expensive to get design professionals to generate 1-line diagrams for systems they design

How to Draw 1-Line Diagrams

With MS Power Point

It is even MORE difficult and expensive to get design professionals to update your existing 1-line diagrams, especially if they didn’t originally generate them

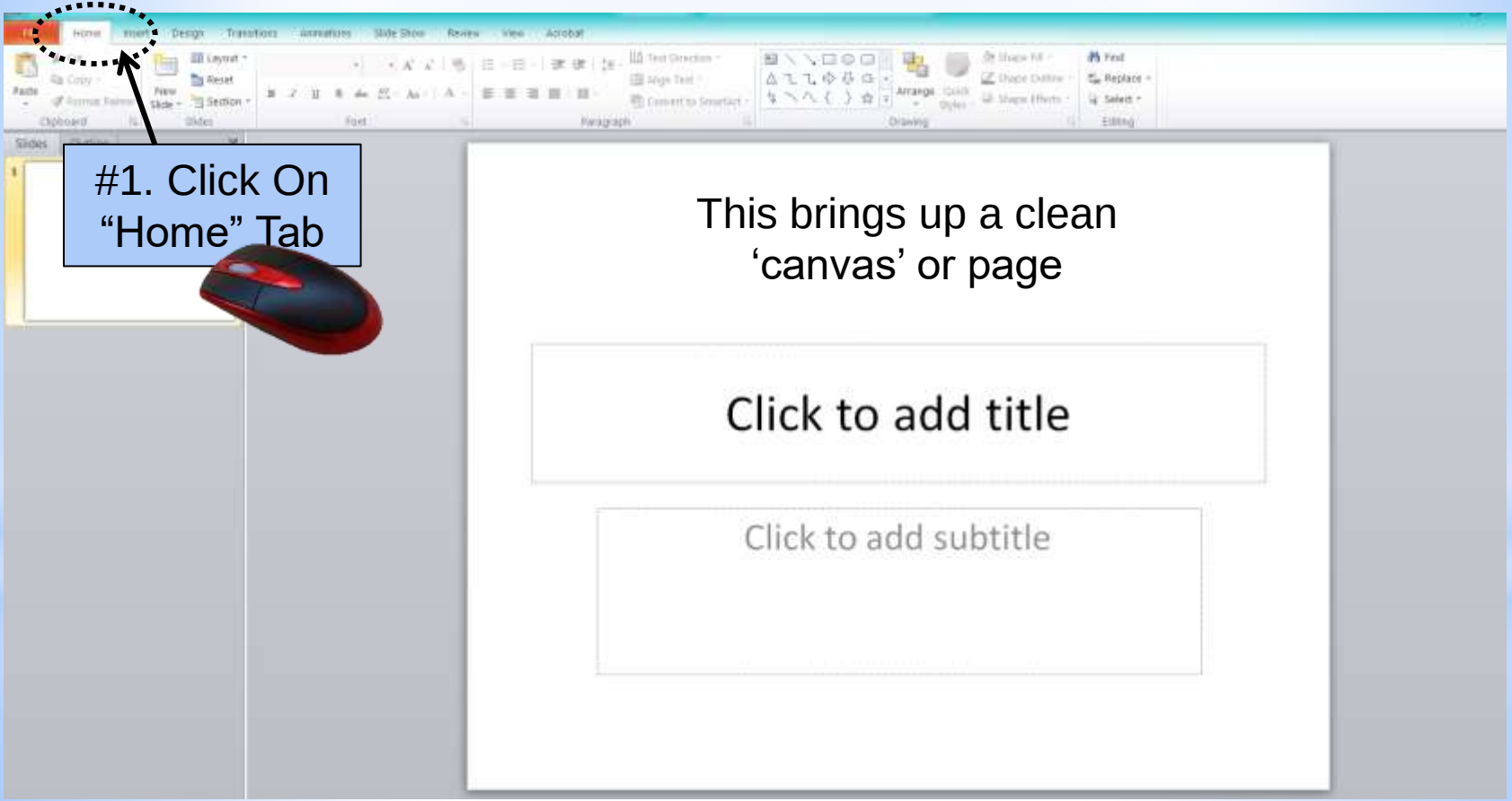
Thus, the opportunity for the DIY

Following is a method for using Microsoft Power Point to draw and update your own

It also forces you to better understand your systems and self-evaluate compliance

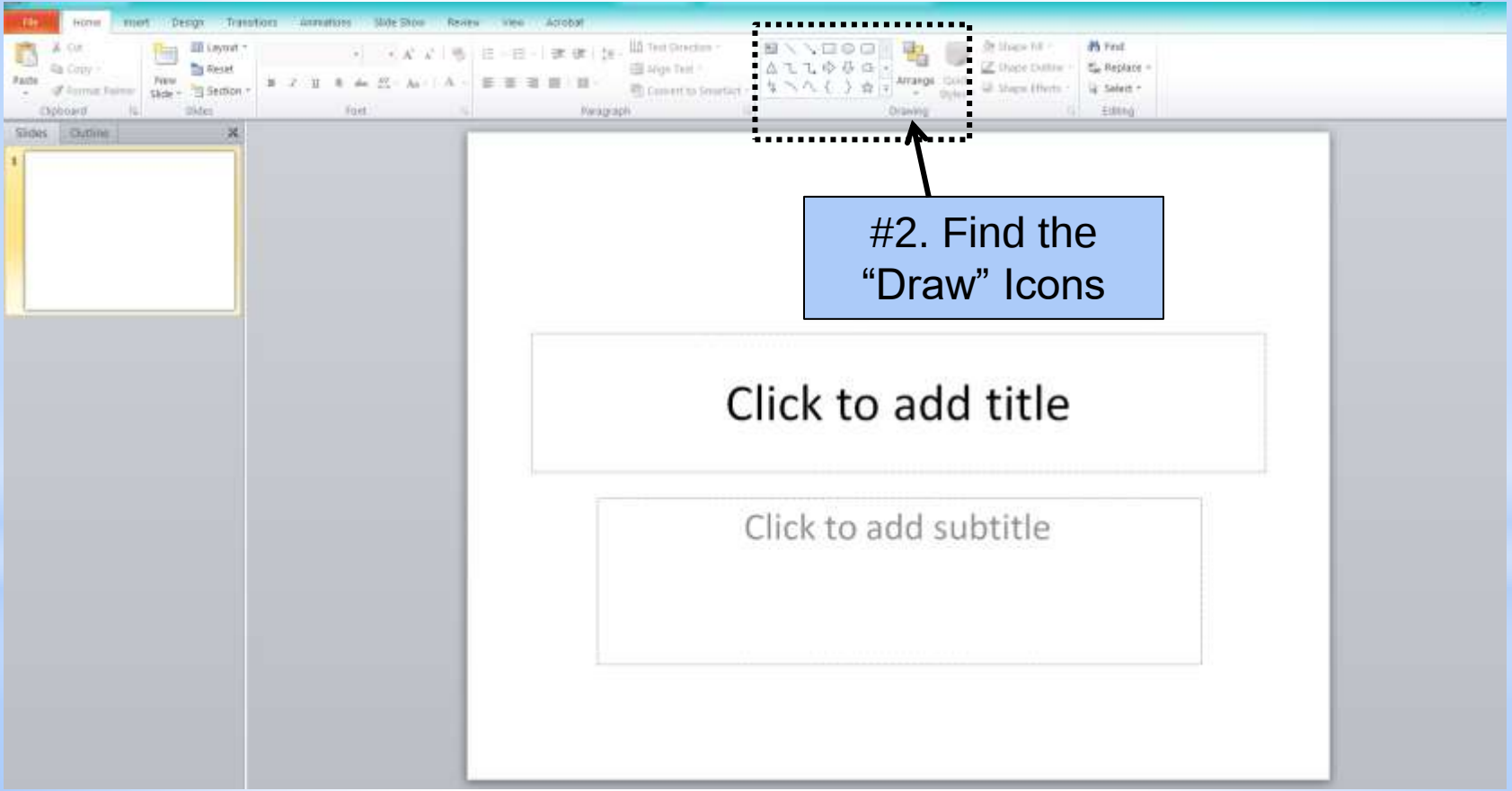
How to Draw 1-Line Diagrams

With MS Power Point



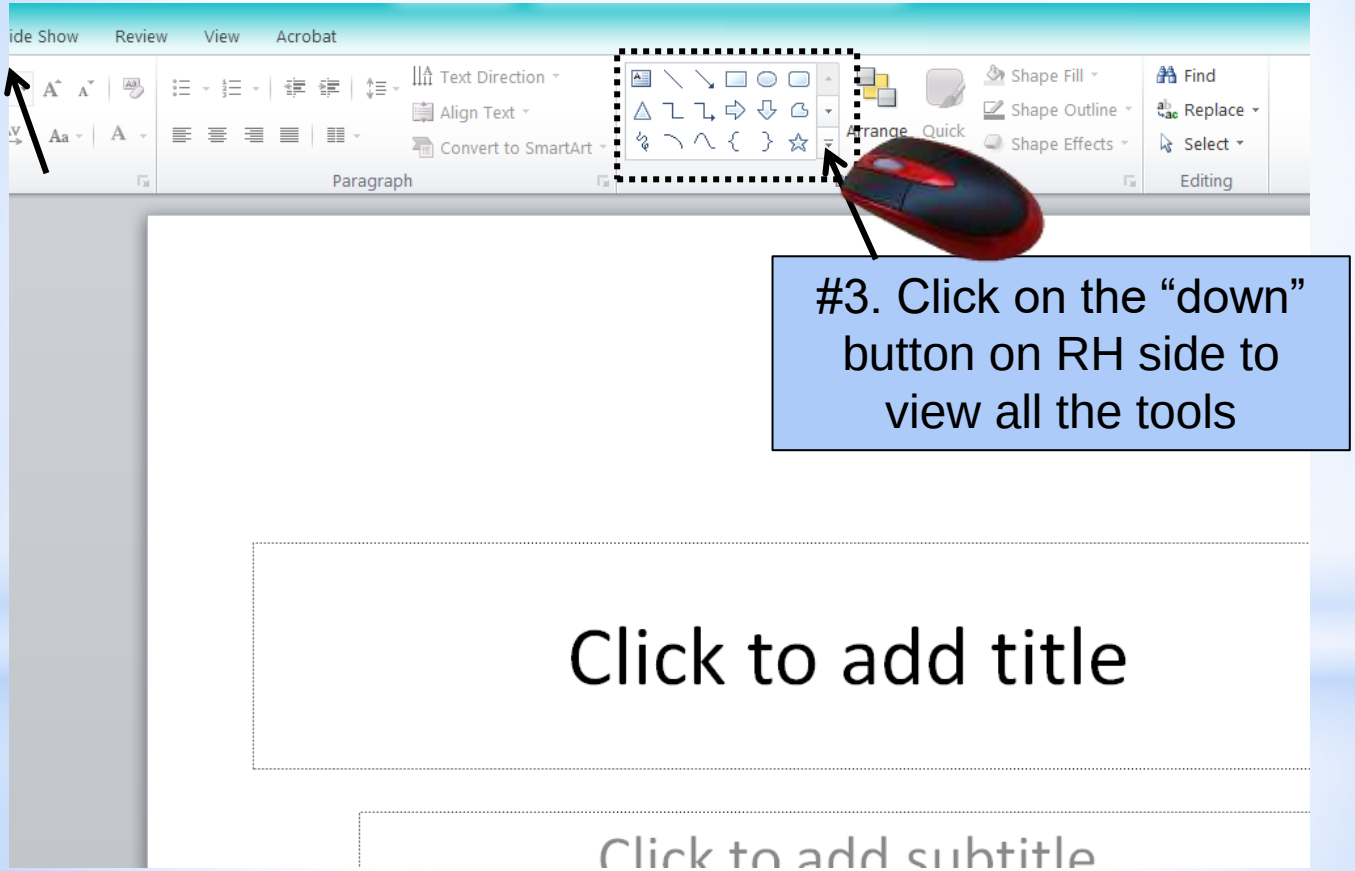
How to Draw 1-Line Diagrams

With MS Power Point



How to Draw 1-Line Diagrams

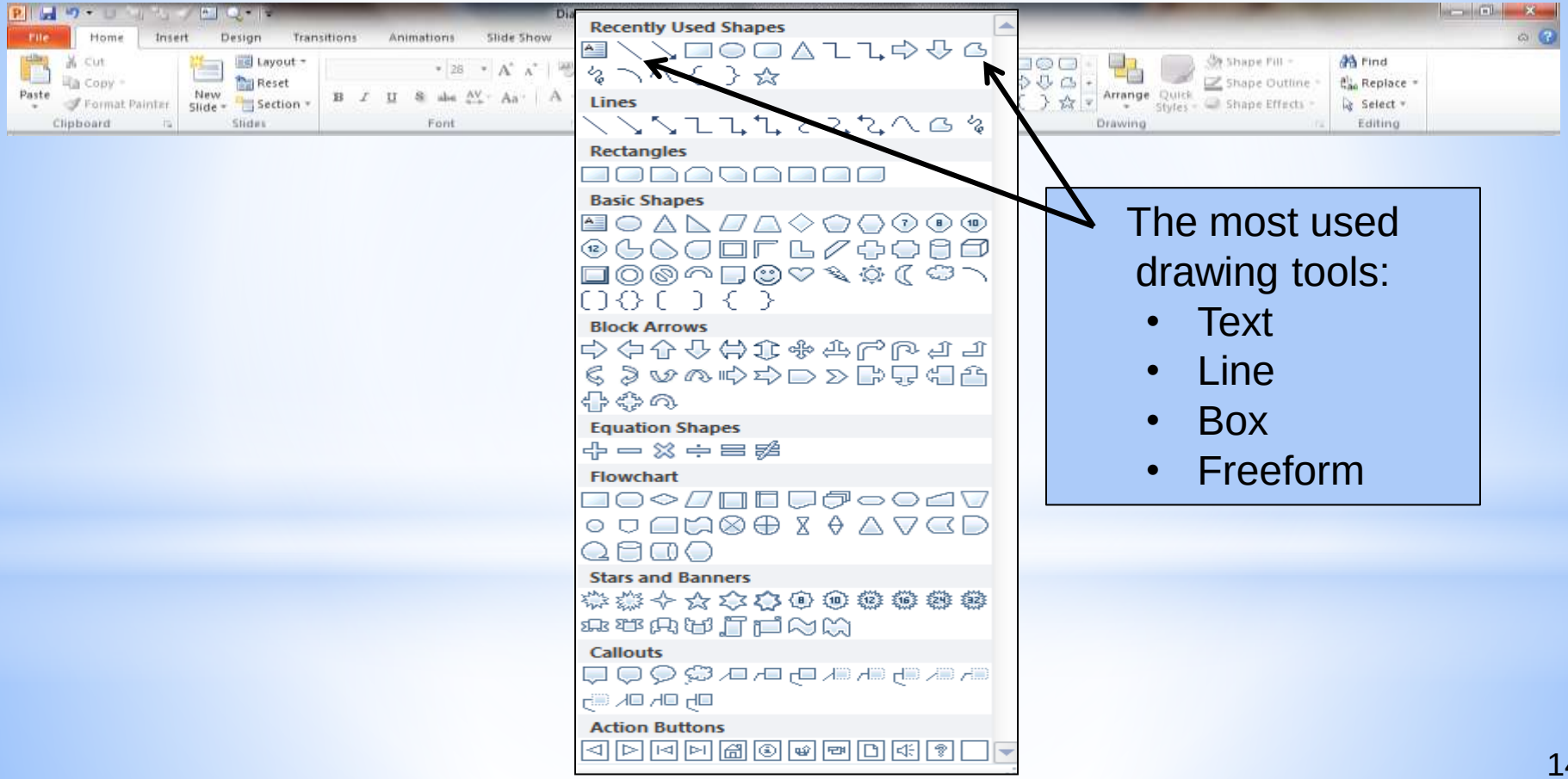
With MS Power Point



#3. Click on the “down” button on RH side to view all the tools

How to Draw 1-Line Diagrams

With MS Power Point

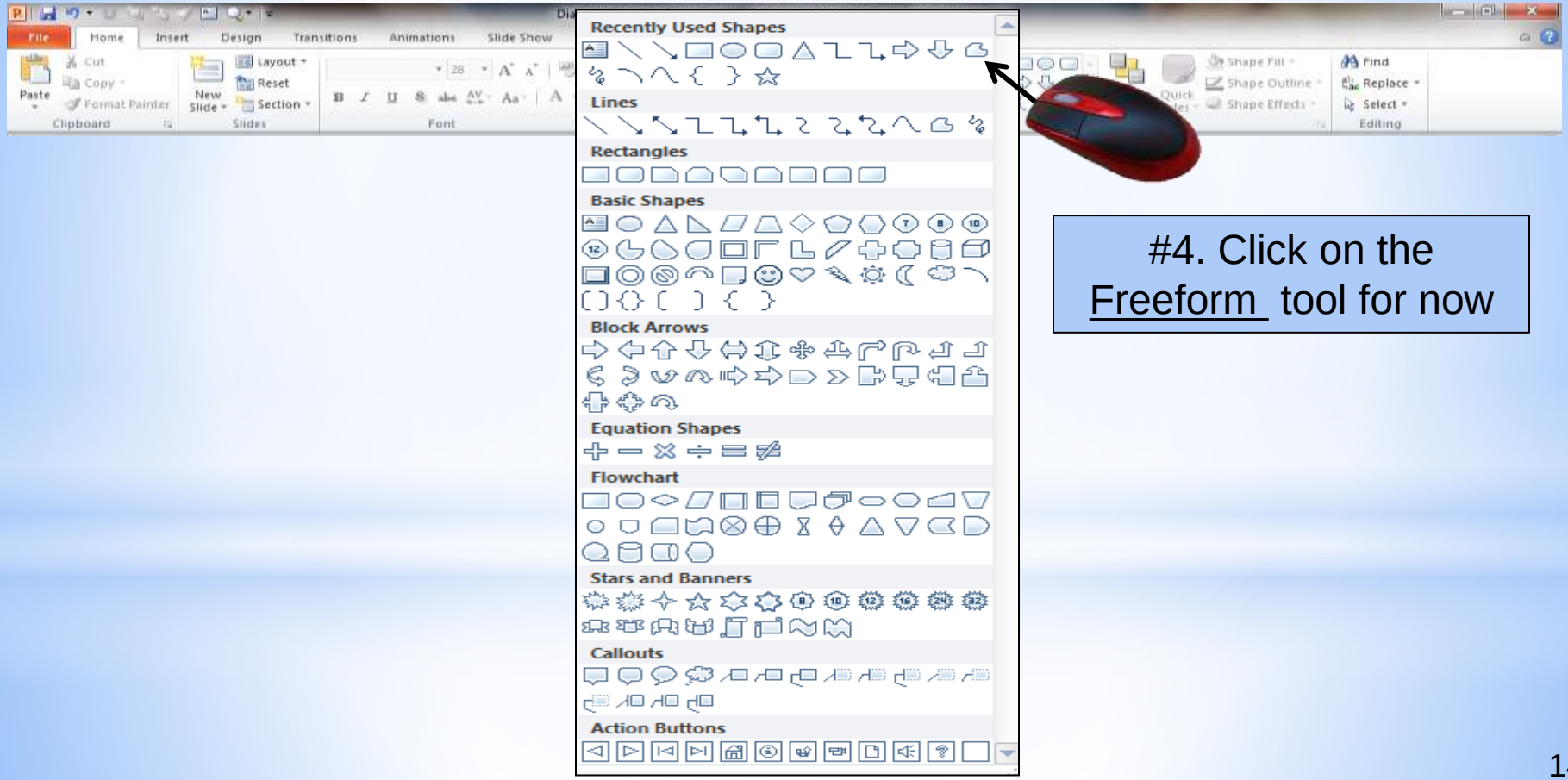


The most used drawing tools:

- Text
- Line
- Box
- Freeform

How to Draw 1-Line Diagrams

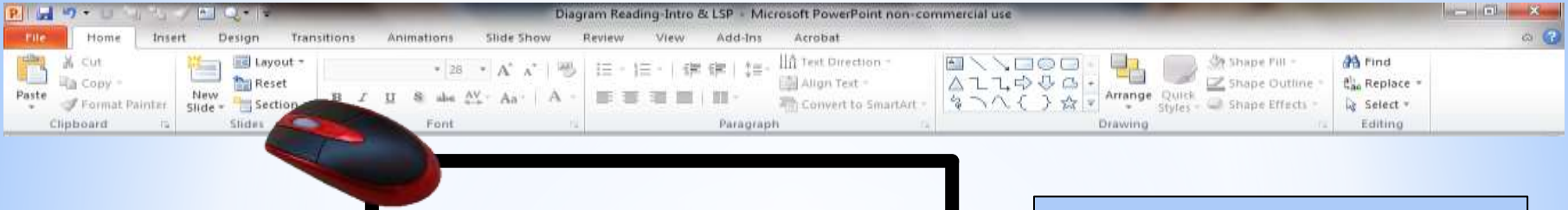
With MS Power Point

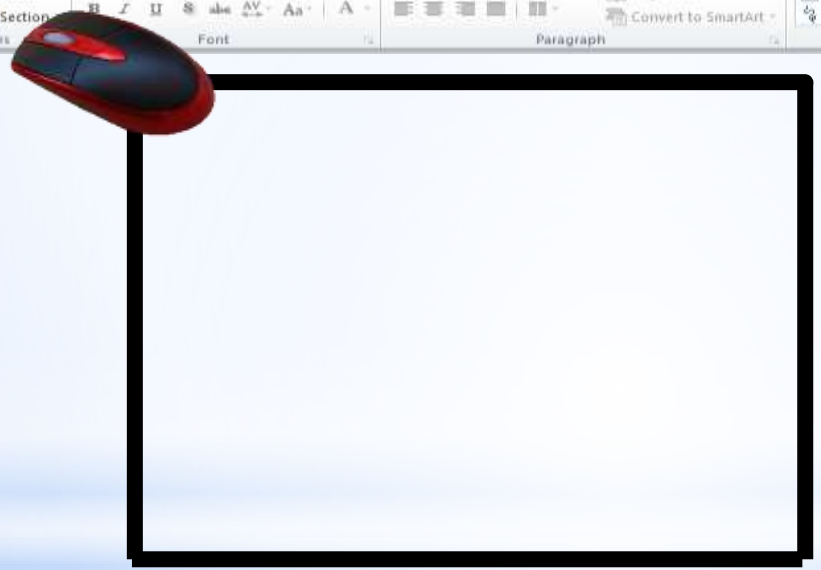


#4. Click on the Freeform tool for now

How to Draw 1-Line Diagrams

With MS Power Point



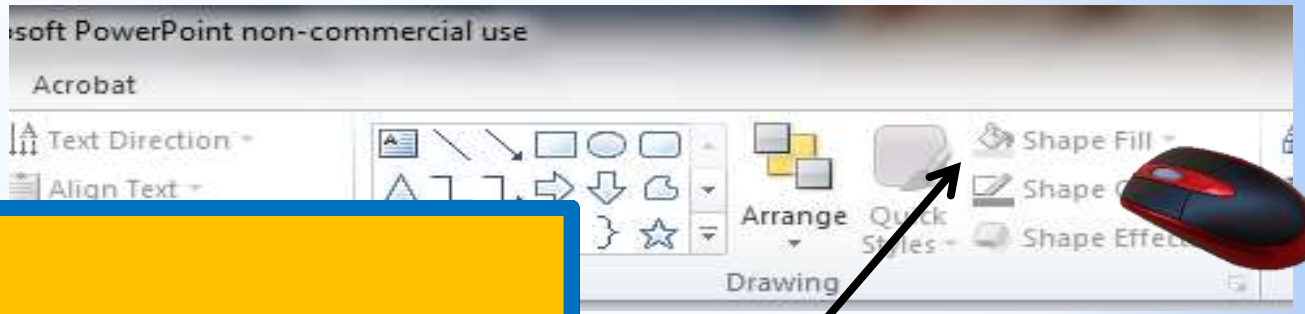


#5. Move the mouse & left click where you want to change direction

Hold the “Shift” key down if you want to move “Orthographically” (straight across of up/down)

How to Draw 1-Line Diagrams

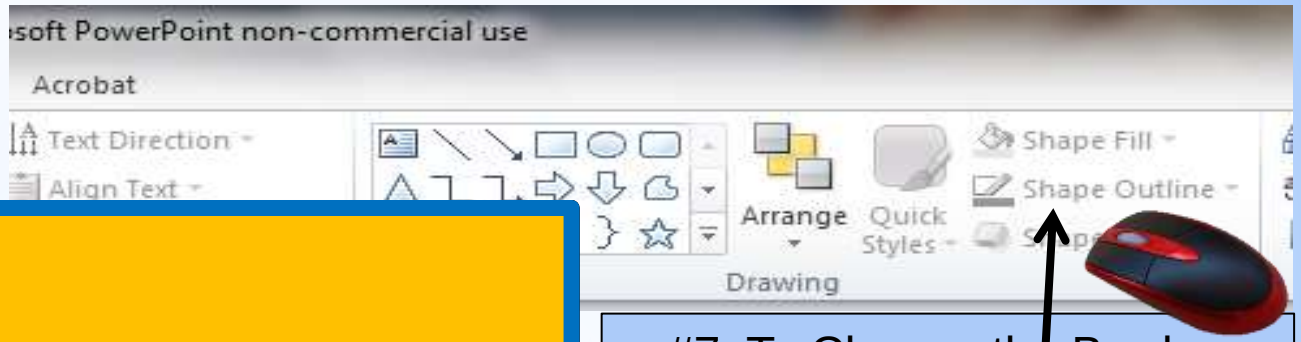
With MS Power Point



#6. To Colorize: click on the “Shape Fill” button & select from the color Options

How to Draw 1-Line Diagrams

With MS Power Point



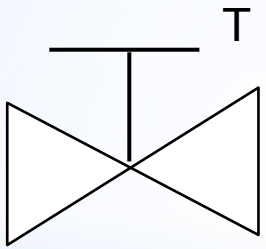
#7. To Change the Border: click on the “Shape Outline” button & select from the outline options

- Standard Color
- No Outline
- More Outline Colors
- Weight (line width)
- Dashes
- Arrow

How to Draw 1-Line Diagrams

With MS Power Point

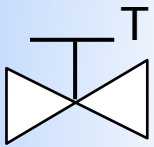
Let’s start by making a valve with a tamper switch

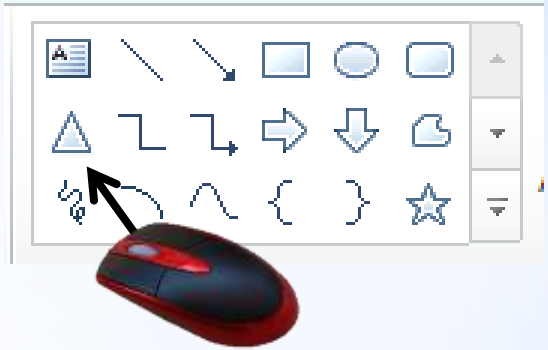


How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



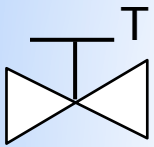


#1. Left-Click on the “Triangle” tool in the Drawing drop down

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch

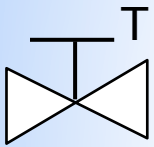


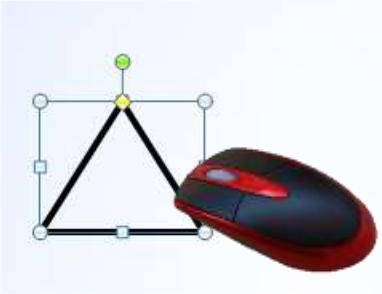
#2. Left-Click on the canvas and slide the mouse to the right to form a small triangle. Size doesn't matter.

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



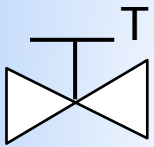


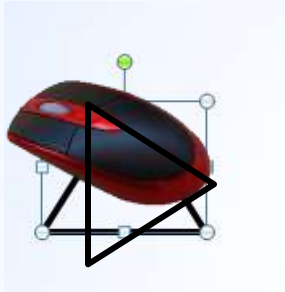
#3. Left-Click on the triangle and you'll see a box with "handles" and a green handle at the top. This is the rotate tool.

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch





#4. At the same time,

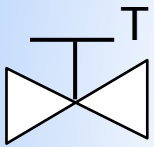
- Hold down the “Shift” key
- Left-Click on the green “rotate handle” and
- Slide the mouse to the right.

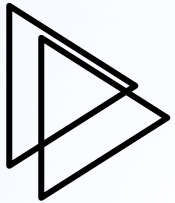
- This will rotate the triangle 90° to the right

How to Draw 1-Line Diagrams

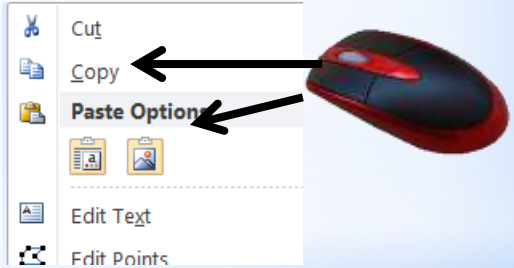
With MS Power Point

Draw a valve with a tamper switch





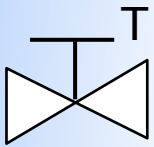
#5. Make a copy of the triangle by right-clicking on it and selecting “copy”, then repeat and select “paste”



How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



Next, rotate the 2nd triangle so it faces the 1st triangle

#6. At the same time,

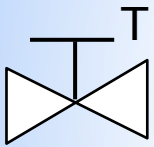
- Hold down the “Shift” key
- Left-Click on the green “rotate handle” and
- Slide the mouse to the left.

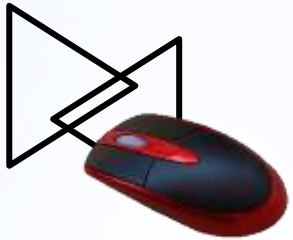
- This will rotate the triangle 90° to the left

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



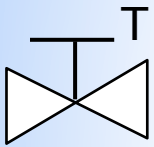


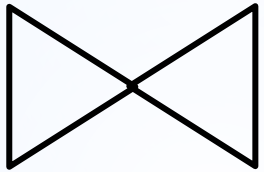
#7 Left-click on the 2nd triangle and move it until the facing tips meet

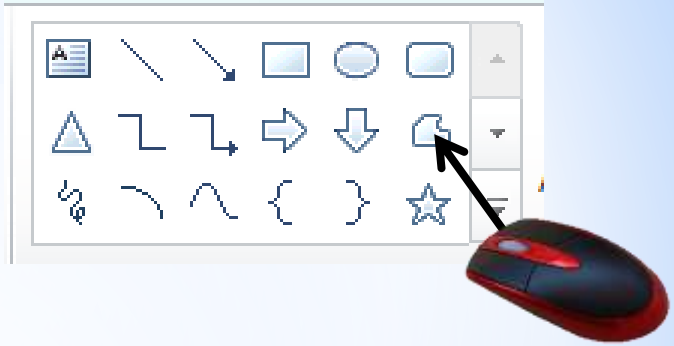
How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch





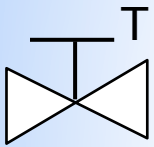


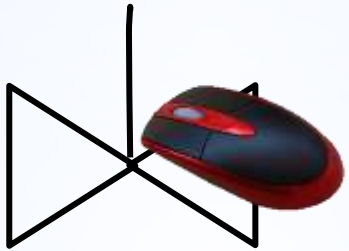
#8. Left-Click on the “Freeform” tool in the Drawing drop down

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



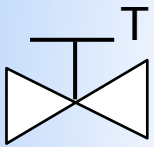


#9. Position the mouse at the intersection of the triangle tips, hold down the left button, and move the mouse upward.

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch

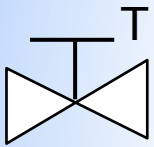


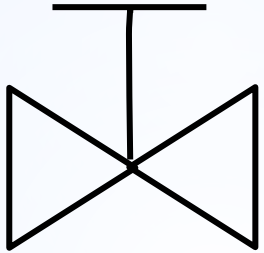
#10. Position the mouse left of the line just drawn, hold down the left button, and move the mouse to the right.

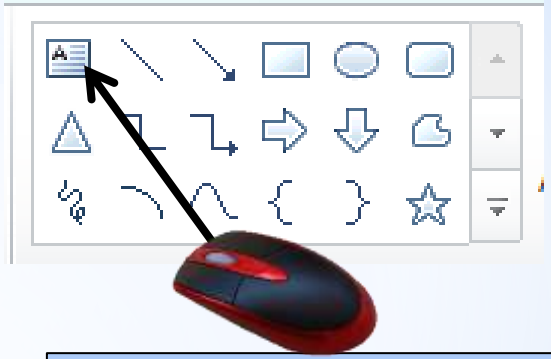
How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch





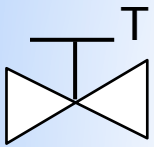


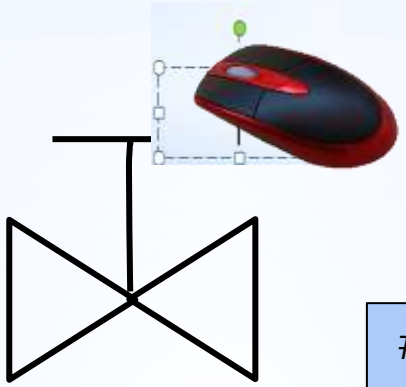
#11. Left-Click on the “Text Box” tool in the Drawing drop down

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



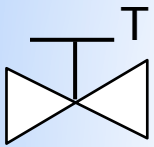


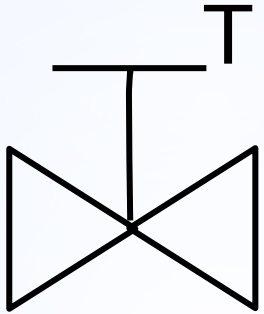
#12. Left-Click on the at the end of the line just made and slide right. This forms an empty text box.

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



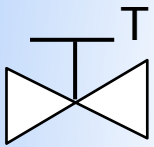


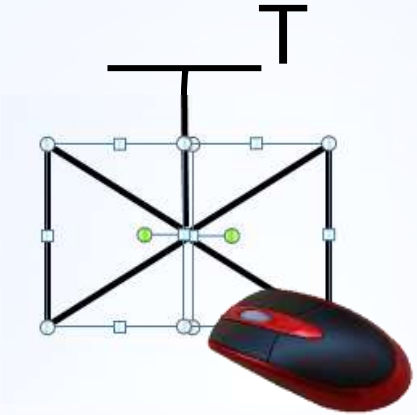
#13. Type a capital “T”. Change the font size as needed

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch





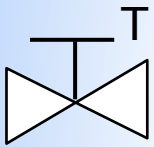
Next, color the valve body ‘white’ (or other color) so it stands out

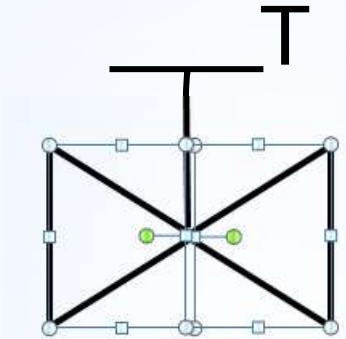
#14. Left click on each triangle (the handles will now show)

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



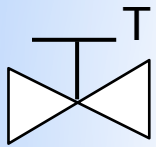


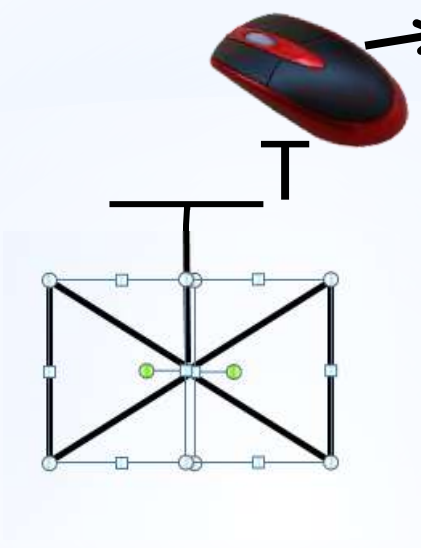
#15. Left click on the 'Shape Fill' tool at the top of the screen

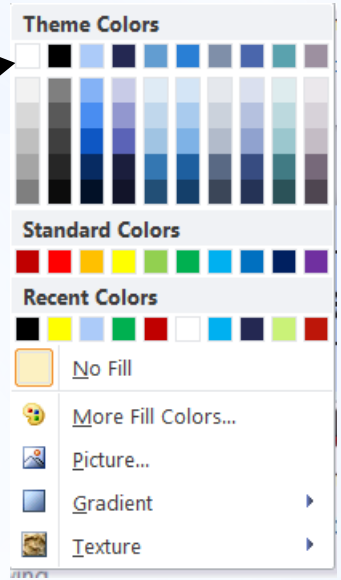
How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch





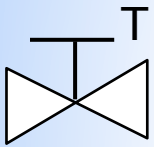


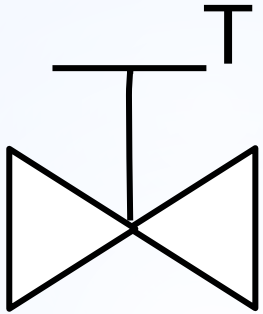
#16. This opens the 'Theme Color' options. Left-Click on 'white' or whatever color you want

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



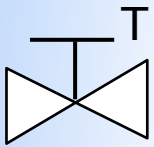


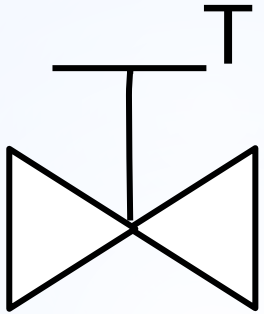
This colorizes your valve

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



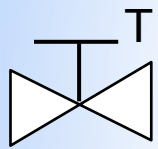


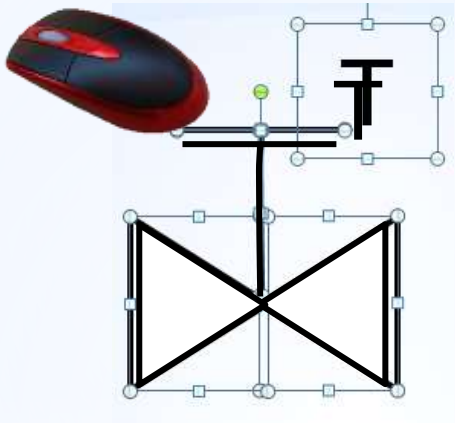
Now you “group” all your objects into a single item. That way you just copy & paste the entire valve and only need to draw it once.

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



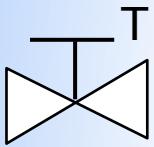


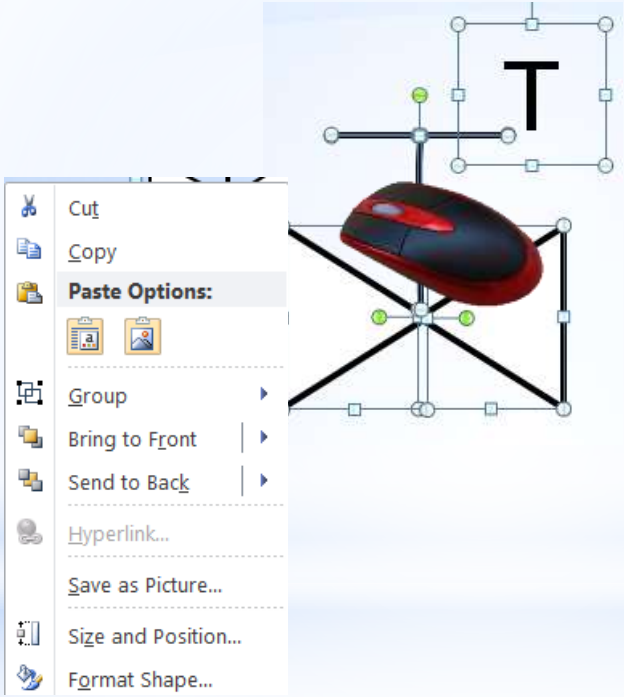
#17. Set the mouse above the top left corner of the drawn objects, left-click and slide to the bottom right of the objects so all of them are highlighted, and release the mouse button

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



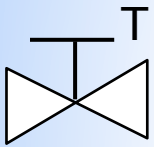


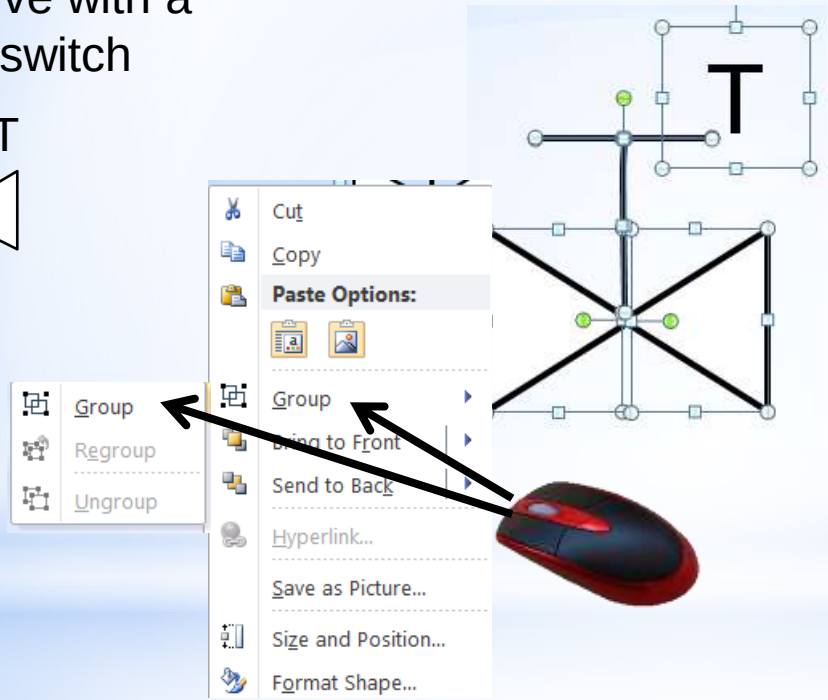
#18. With the mouse hovering over the highlighted objects, right click on the mouse. Click on “Group” in the pop-up menu and then “new”.

How to Draw 1-Line Diagrams

With MS Power Point

Draw a valve with a tamper switch



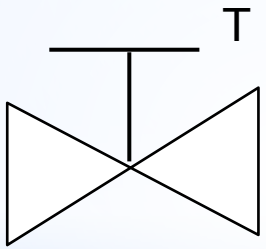


#19. Click on “Group” in the pop-up menu and then “Group” on the second menu.

How to Draw 1-Line Diagrams

With MS Power Point

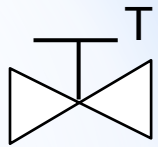
Now you have a valve
with a tamper switch



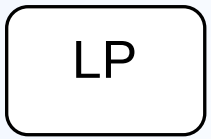
How to Draw 1-Line Diagrams

With MS Power Point

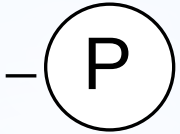
Use the same basic steps to create a Library of parts of your 1-line diagram, such as:



Flow Switch



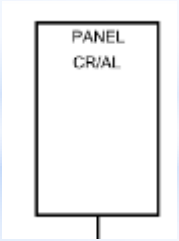
Lo Pressure Switch



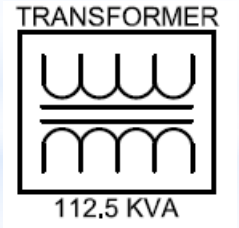
Pressure Gauge

Dry Valve

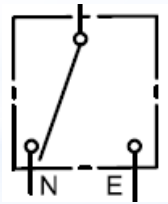
Air Compressor



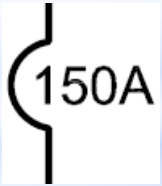
Elec Panel



Transformer



Auto Transfer S

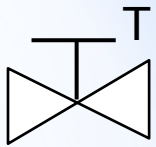


Breaker

How to Draw 1-Line Diagrams

With MS Power Point

Use the same basic steps to create a Library of parts of your 1-line diagram, such as:



OR You can hire a professional to draw your 1-Line diagrams & give you the file so you can update yourself

ssor

Switch

Hint

Hint

LLSC LAUZON LIFE SAFETY CONSULTING

Elec Panel

Transformer

Auto Transfer S

Breaker

How to Draw 1-Line Diagrams

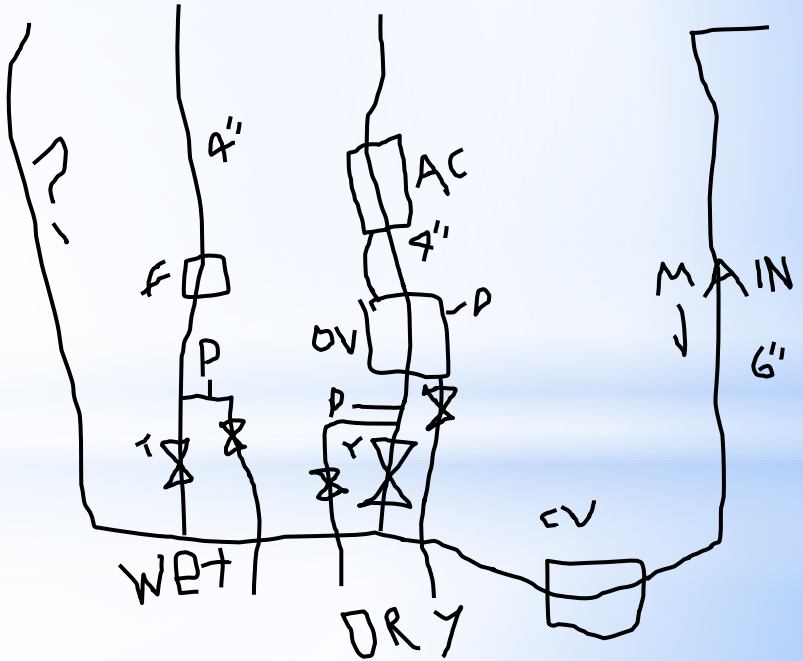
With MS Power Point

Now, let’s actually draw a 1-line sprinkler drawing

How to Draw 1-Line Diagrams

With MS Power Point

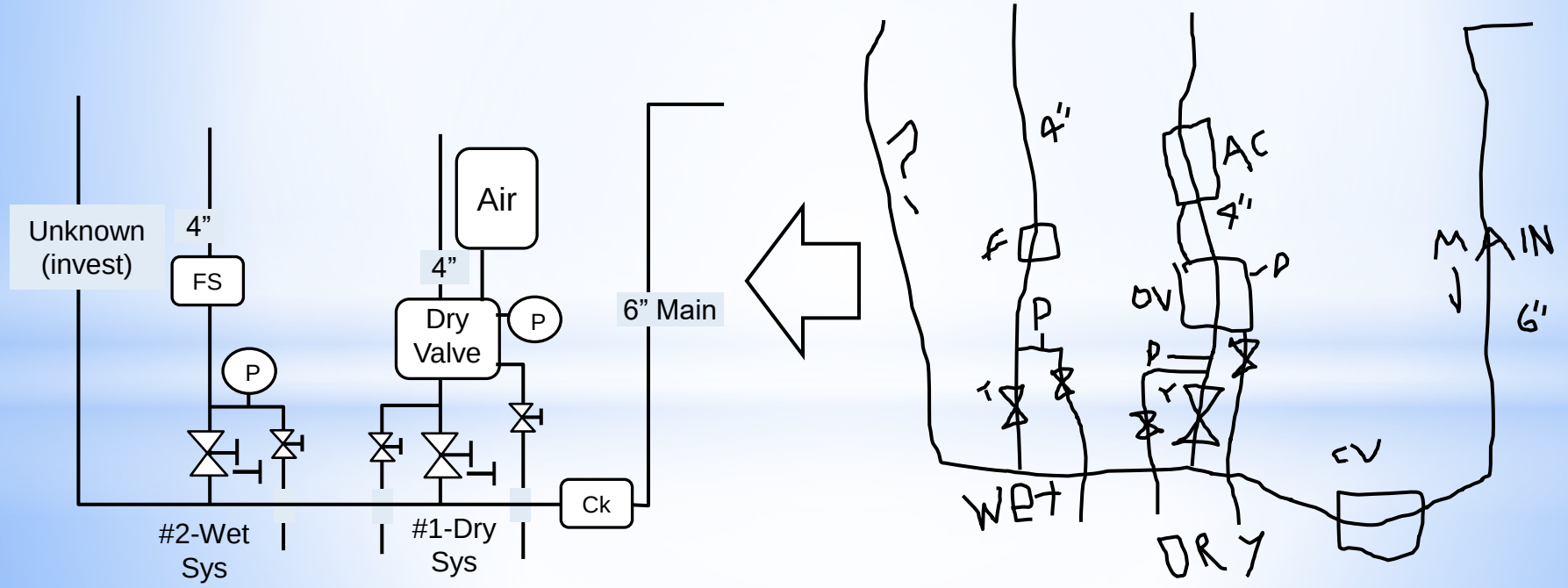
Go to the various locations in your building to view the actual systems and sketch their layout. Doesn't have to be pretty.



How to Draw 1-Line Diagrams

With MS Power Point

Take your sketch back to your computer, open power point, and insert the component parts from your library, drawing lines to represent the piping & typing as needed



How to Draw 1-Line Diagrams

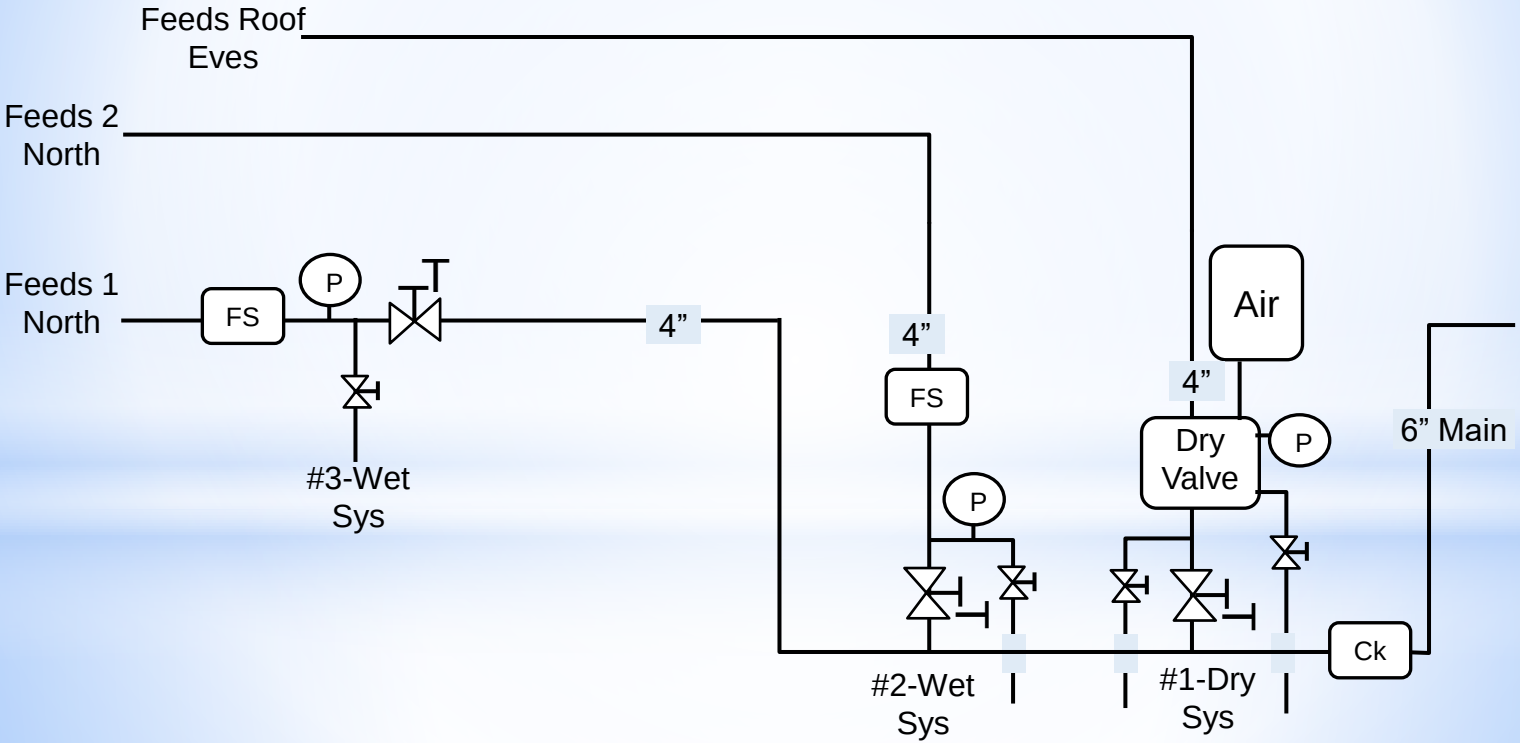
With MS Power Point

Go to the other key locations in your building with sprinkler components and do the same thing

How to Draw 1-Line Diagrams

With MS Power Point

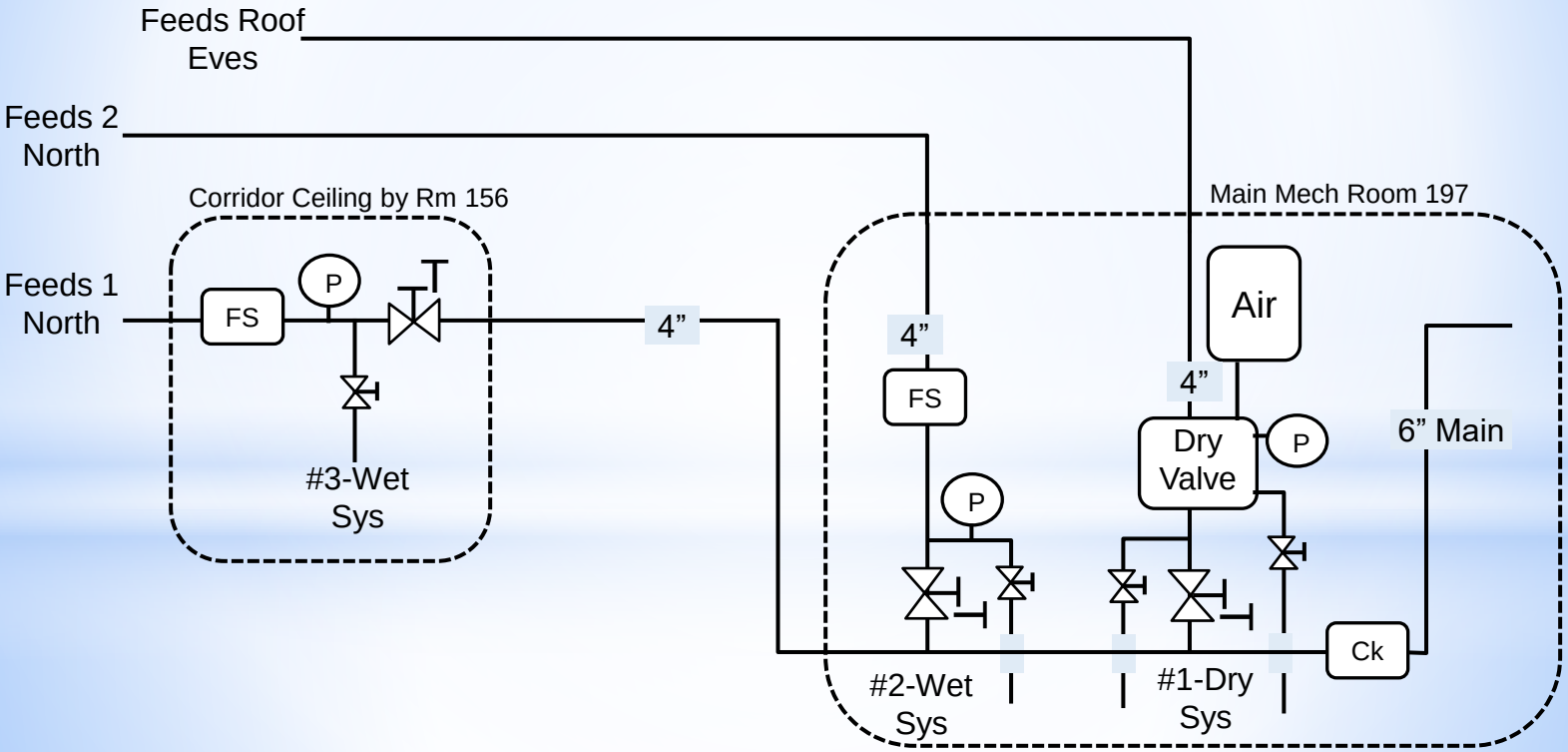
Update the 1-line as more info is gathered

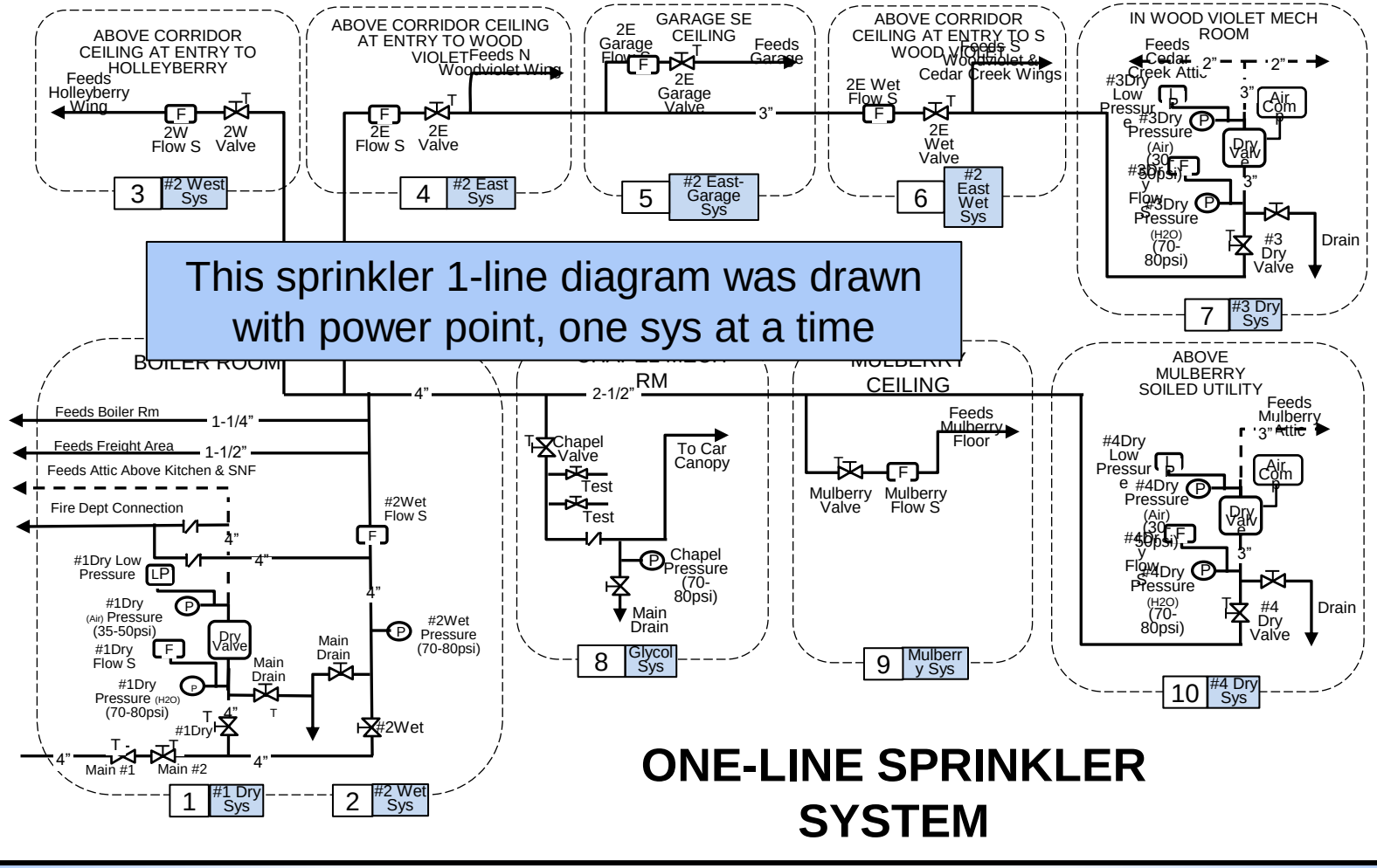


How to Draw 1-Line Diagrams

With MS Power Point

Put a box around each set of components and label where located




ABOVE CORRIDOR CEILING AT ENTRY TO HOLLEYBERRY
Feeds Holleyberry Wing
2W Flow S
2W Valve
3
#2 West Sys
ABOVE CORRIDOR CEILING AT ENTRY TO WOOD VIOLET
Feeds N Woodviolet Wing
2E Flow S
2E Valve
4
#2 East Sys
GARAGE SE CEILING
2E Garage Flow S
Feeds Garage
2E Garage Valve
3"
5
#2 East-Garage Sys
ABOVE CORRIDOR CEILING AT ENTRY TO S WOOD VIOLET
Feeds S Woodviolet & Cedar Creek Wings
2E Wet Flow S
2E Wet Valve
6
#2 East Wet Sys
IN WOOD VIOLET MECH ROOM
Feeds Cedar Creek Attic
2"
2"
#3Dry Low Pressure
3"
Air Comp
#3Dry Pressure (Air) (30-50psi)
Dry Valve
#3Dry Flow S
3"
#3Dry Pressure (H2O) (70-80psi)
#3 Dry Valve
Drain
7
#3 Dry Sys
This sprinkler 1-line diagram was drawn with power point, one sys at a time
BOILER ROOM
4"
Feeds Boiler Rm
1-1/4"
Feeds Freight Area
1-1/2"
Feeds Attic Above Kitchen & SNF
Fire Dept Connection
4"
#2Wet Flow S
#1Dry Low Pressure
LP
4"
4"
#1Dry (Air) Pressure (35-50psi)
#2Wet Pressure (70-80psi)
Dry Valve
#1Dry Flow S
Main Drain
Main Drain
#1Dry Pressure (H2O) (70-80psi)
4"
#1Dry
#2Wet
4"
Main #1
Main #2
4"
1
#1 Dry Sys
2
#2 Wet Sys
RM
2-1/2"
Chapel Valve
To Car Canopy
Test
Test
Chapel Pressure (70-80psi)
Main Drain
8
Glycol Sys
CEILING
Feeds Mulberry Floor
Mulberry Valve
Mulberry Flow S
9
Mulberry Sys
ABOVE MULBERRY SOILED UTILITY
Feeds Mulberry
3" Attic
#4Dry Low Pressure
Air Comp
#4Dry Pressure (Air) (30-50psi)
Dry Valve
#4Dry Flow S
3"
#4Dry Pressure (H2O) (70-80psi)
#4 Dry Valve
Drain
10
#4 Dry Sys
ONE-LINE SPRINKLER SYSTEM

Lunch & Learn

October 8, 2020

One-Line Diagrams

(aka: Single-Line Diagrams)
(aka: Riser Diagrams)

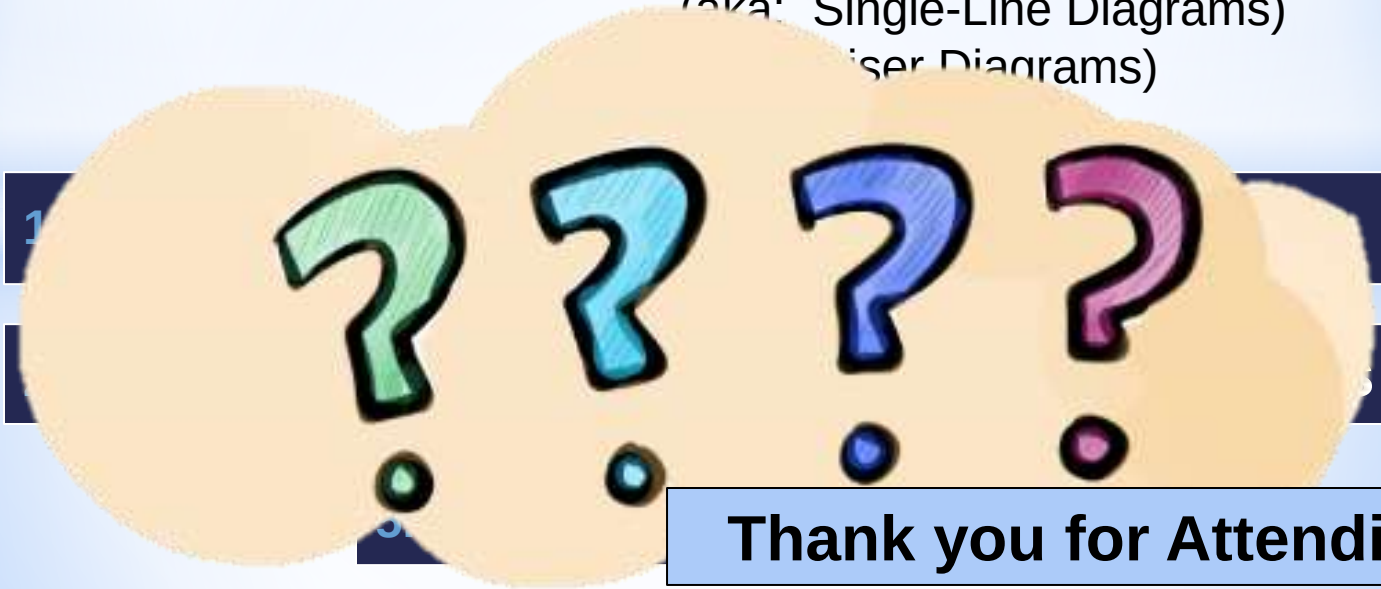
1. Electrical 1-Lines
2. Plumbing 1-Lines
3. HVAC 1-Lines
4. Med Gas 1-Lines
5. Sprinkler 1-Lines

Lunch & Learn

October 8, 2020

One-Line Diagrams

(aka: Single-Line Diagrams)
iser Diagrams)



Thank you for Attending